No.01

Oki Data CONFIDENTIAL

PACEMARK 4410/
MICROLINE 4410 PRINTER
Maintenance Manual
(ODA/OEL/AOS)

[Rev. 7]

Related drawings

Drawing No.	Name
40496501TL	PACEMARK/MICROLINE 4410 Disassembly for Maintenance
40496501TR	PACEMARK/MICROLINE 4410 RSPL

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PREFACE

This maintenance manual describes how to maintain the Pacemark 4410/Microline 4410 printer in the field.
This manual is for customer engineers.
For further information, refer to the Users Manual for handling or operating the equipment.

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1. CONFIGURATION

1.1 Basic System Configuration

The basic system configuration of Pacemark 4410/ Microline 4410 is illustrated in Figure 1.1.

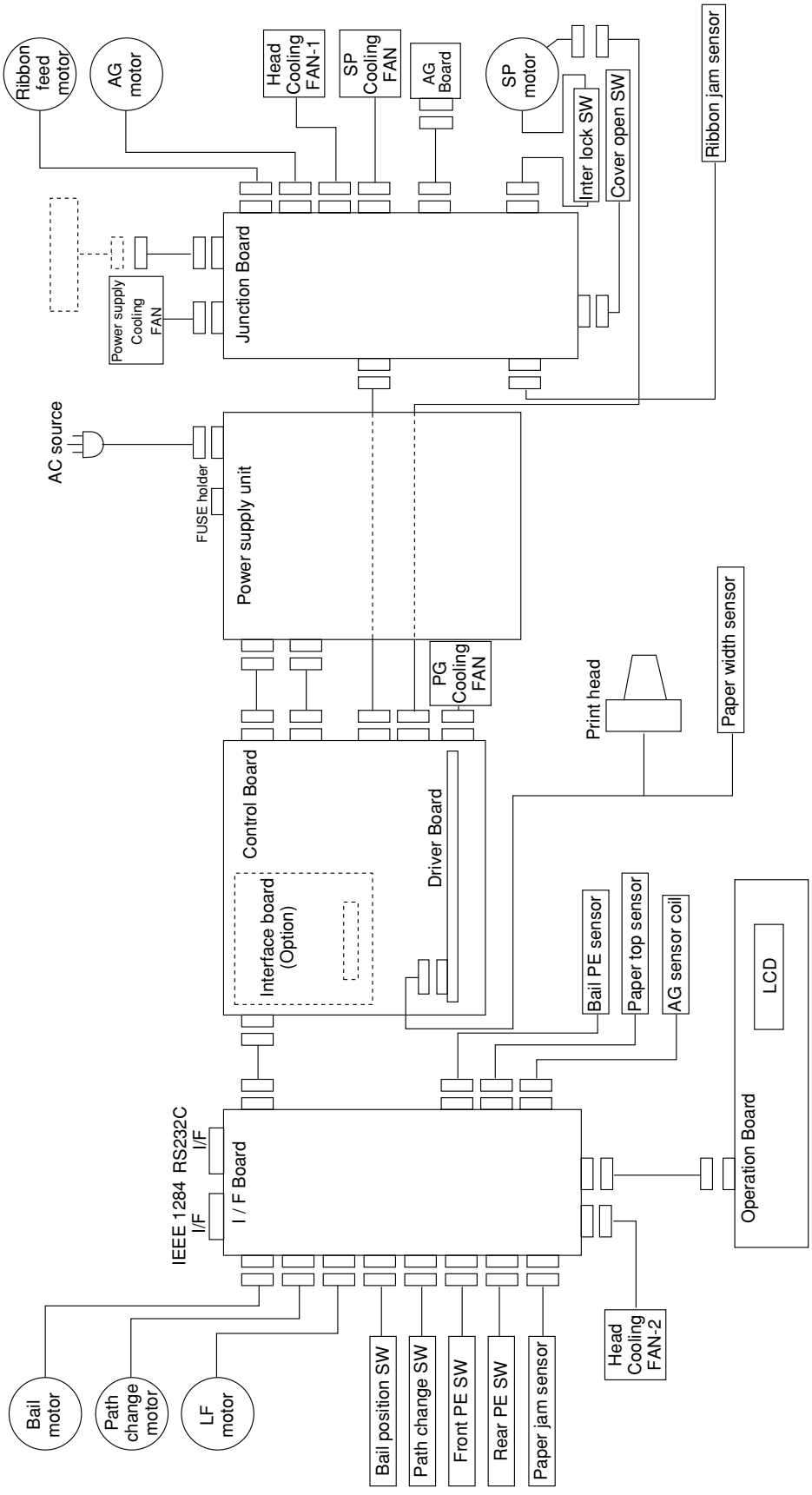


Figure 1.1

1.2 Printer Specifications

This printer unit is composed with the following hardware.

- Printer mechanism
- Control Board
- Driver Board
- I/F Board (including IEEE 1284 bidirectional parallel interface and RS-232C serial I/F)
- AG Board
- Operation Board
- Junction Board
- Power supply unit
- Covers

Figure 1-2 show the printer unit configuration.

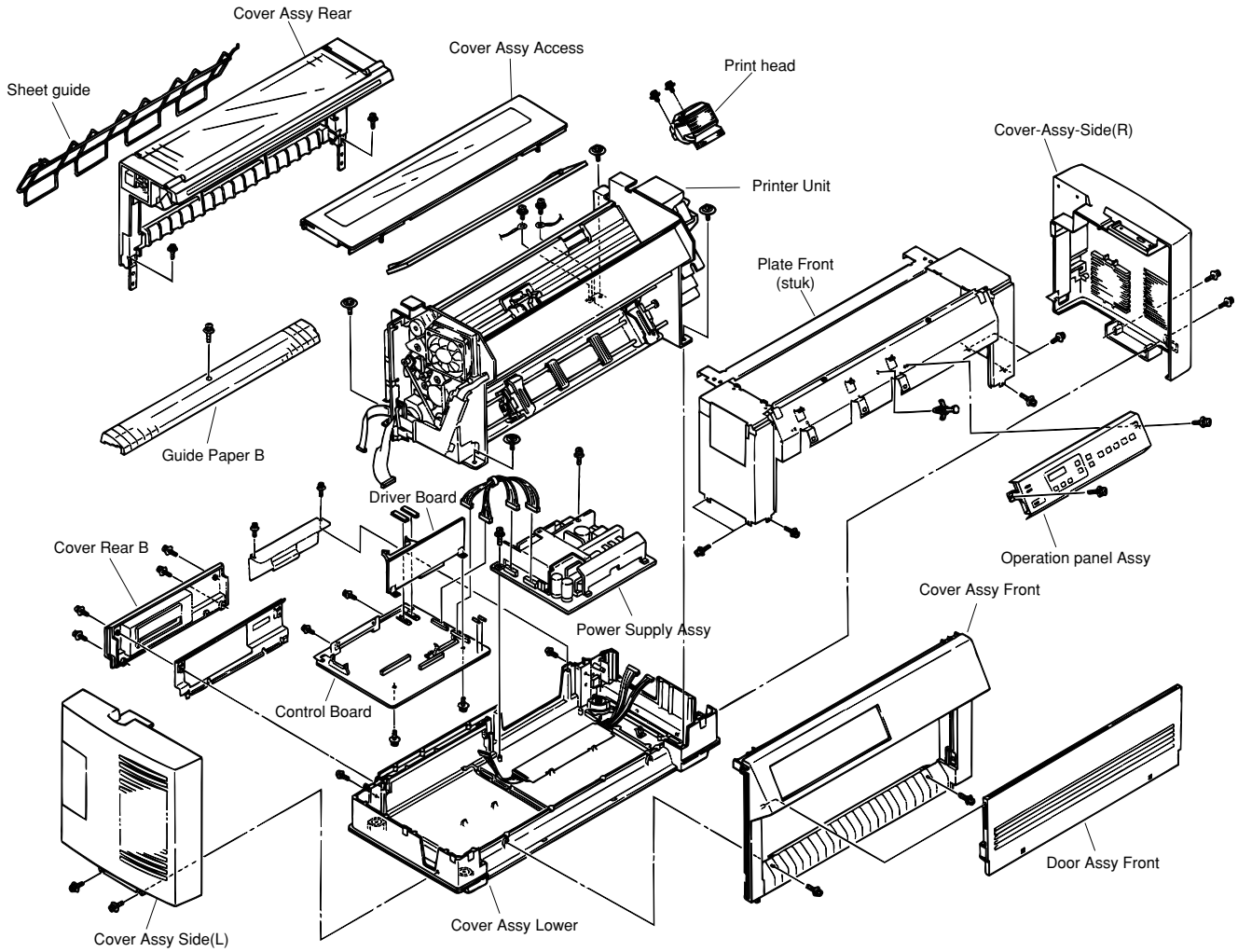
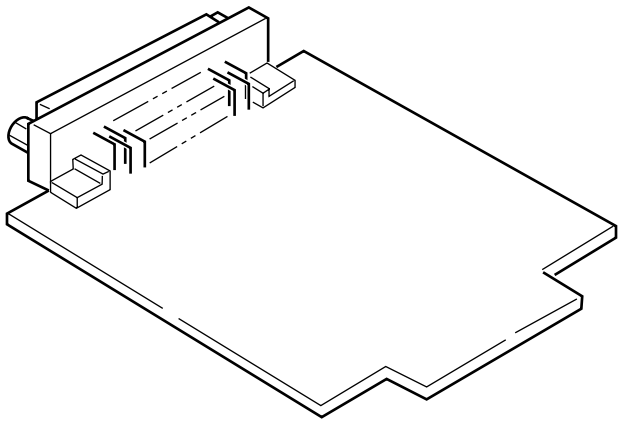


Figure 1.2

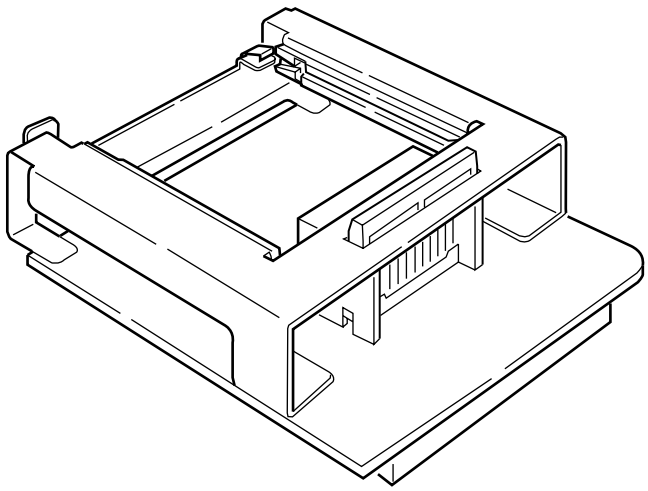
1.3 Option Specifications

Options available for Pacemark 4410/ Microline 4410 are as follows.

- Interface Boards
  (a) Serial I/F Board and Attachment Board
  ① Serial I/F Board



② Attachment Board



1.4 Basic Specifications

(1) Dimensions
Width: 768mm(30.24inches) Length: 385mm(15.16inches) Height: 358mm(14.09inches)

(2) Weight
Approx. 42kg (92.6lbs)

(3) Form
Continous Paper
One-part paper
Ream weight: 45 to 90g/m2 (12 to 24 lb)
Multiple-part paper Max.0.79mm(0.031inches)total thickness(with front feed)
Max.0.36mm(0.014inches)total thickness(with rear feed)

Paper type	Ream weight	Number of sheet
Carbon-lined paper	35 to 40 g/m2 (9 to 11 lbs)	Ten sheet maximum including original (with front feed)
Pressure-senstive paper		Six sheet maximum including original (with rear feed)
Interleaf paper	Paper 35 to 52 g/m2 (9 to 14 lbs) Corbon paper 34 g/m2 (9 lbs)	Seven sheet maximum including original (with front feed) Four sheet maximum including original (with rear feed)

When 7p or more papers are used for the front tractor, "High Impact Copy" should be selected in the menu mode to print these papers.

Continuous Envelope
Weight : Max. 90 g/m2 (24lb)
Thickness : Max. 0.36mm (0.014 inch)
Width : 76.2 - 254mm (3 - 10 inches)
Media supply : Front paper feed only

Card
Weight : Max. 375 g/m2 (100lb)
Thickness : Max. 0.20mm (0.008 inch)
Size : 5 x 8 inches (separated)
Media supply : Front paper feed only

Label
Thickness : Max 0.28mm (0.011 inch)
Size : Max. 381 x 83mm (15 x 3.25 inches)
Media supply : Front paper feed only

(4) Print speed

Print Mode	Character Pitch				
	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
HSD	1066 CPS	1066 CPS	1066 CPS	1066 CPS	1066 CPS
NLQ	200 CPS	200 CPS	200 CPS	200 CPS	200 CPS
UTILITY	800 CPS	800 CPS	800 CPS	800 CPS	800 CPS

(5) Maximum Number of Dot Columns per Line

a) Graphics

Single Density	Double Density	Quadruple Density
816	1,632	3,264

b) Text

Print Mode		Character Pitch (CP)				
		10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
ML, EPSON, IBM	UTILITY	1,632	1,958	2,448	2,798	3,264
ML, EPSON, IBM	NLQ	3,264	3,917	4,896	5,596	6,528
ML, EPSON, IBM	HSD	1,224	1,468	1,836	2,098	2,448

(6) Maximun Number of Character per Line

Character Pitch (CPI)	5	6	7.5	8.5	10	12	15	17.1	20
ML EPSON IBM	68	81	102	116	136	163	204	233	272

(7) Printhead
Print method: Impact dot matrix
Number of dot wires: 9 wires x 2 rows
Dot wire diameter: 0.36mm(0.014inch)

(8) Line feed Speed
6 LPI spacing, one LF = 60 ms
8 LPI spacing, one LF = 52 ms
Continuous paper feed rate is 15 inches per second. (at head gap 1, 2)

(9) Line Feed Pitches
6 LPI 0.167 inch (4.23mm)
8 LPI 0.125 inch (3.175mm)
A variable line feed pitch of n/216 inch (integer n: $0 \leq n \leq 255$) can also be specified. Also, 7/72 inch and n/72 inch can be specified.
PROPRINTER n : $1 \leq n \leq 255$
EPSON n : $1 \leq n \leq 255$ (Cannot specify MSB : $1 \leq n \leq 127$)

(10) Power Requirements
a) Input power
Single-phase AC
Voltage : 120VAC +5.5%, -15%
230 VAC ±15%
Frequency : 50/60Hz ±2%

b) Power consumption
Local Test : Max. 295 W (Rolling ASCII, Utility)
Idle : Max. 15W (Energy Star compliant)

c) AC power cable
Length : Approximately 5.9 lt (1.8 m)
Cable conforms to the UL, CSA, and European Standards.

(11) Ambient temperature and relative humidity

	Operating	Non-operating	Storage	Transportation	Unit
Temperature	41 to 95 (5 to 35)	32 to 109.4 (0 to 43)	14 to 122 (-10 to 50)	-40 to 158 (-40 to 70)	°F (°C)
Relative Humidity	20 to 80	10 to 90	5 to 95	5 to 95	%RH

Avoid condensation at all times.

(12) Vibration
Operating : Max. 0.3G (5 to 150 Hz) (except at resonant frequency)
Non-operating : Max. 1G (5 to 150 Hz) (except at resonant frequency)

(13) Impact (Drop Test)
Packing : 12" Drop

(14) Noise
The 8-second average noise is Max. 55 dBA in quiet utility mode. (ISO 7779)

(15) Ribbon
Genuine OKI cartridge ribbon
Ink color : Black
Ribbon life : Approximately 15 million characters (Characters in Utility mode)

(16) Reliability
a) MTBF (mean time between failures)
12,000 hours of power-on time at 25% duty cycle and 35% page density.

b) Printhead life
400 million characters (average) in 10 CPI Utility print mode at 25% duty cycle and 35% page density.

c) Printer life
12,000 hours of power-on time at 25% duty cycle and 35% page density, or 5 years.

d) MTTR
30 minutes, major Sub-assembly level.

Definition of terms
- Duty cycle : Actual operation rate
- Page density : The proportion in area of characters and spaces within print head PPmovable area.
- Power on Time : 8H/day, 25days/month and 12 months/year.

2. THEORY OF OPERATION

2.1 Electrical Operation

The electrical operation of the printer circuit is described in this section.

2.1.1 Summary

Fig. 2-1 shows the block diagram of the printer.
The control board is made up of the microprocessors, peripheral circuits, drive circuits, sensors and interface connectors.
The power to the control board is supplied by the power board through the connector cord.
The pwer to other electrical parts is also distributed through the connectors within the control board.

2.1.2 Microprocessor and the peripheral circuit

(1) Microprocessor (IC24: 80C186)

This processor is a CMOS single-chip computer with integrated peripheral device functions and a 16 bit MPU core.
The processor has a 20 bit address bus and a 16 bit data bus.
It is capable of accessing up to 4M bit program memory and 4M bit of data memory.
The following characteristics are also provided:

- High-Speed DMA Channel × 2
- Programmable Interrupt Controller
- Programmable 16-bit Timer × 3
- Programmable Memory and Peripheral Chip-Select Logic
- Programmable Wait State Generator
- Local Bus Controller

And others.
The function of this microprocessor is to provide a central mechanism for the entire printer by executing the control program through the LSI and driver circuits.

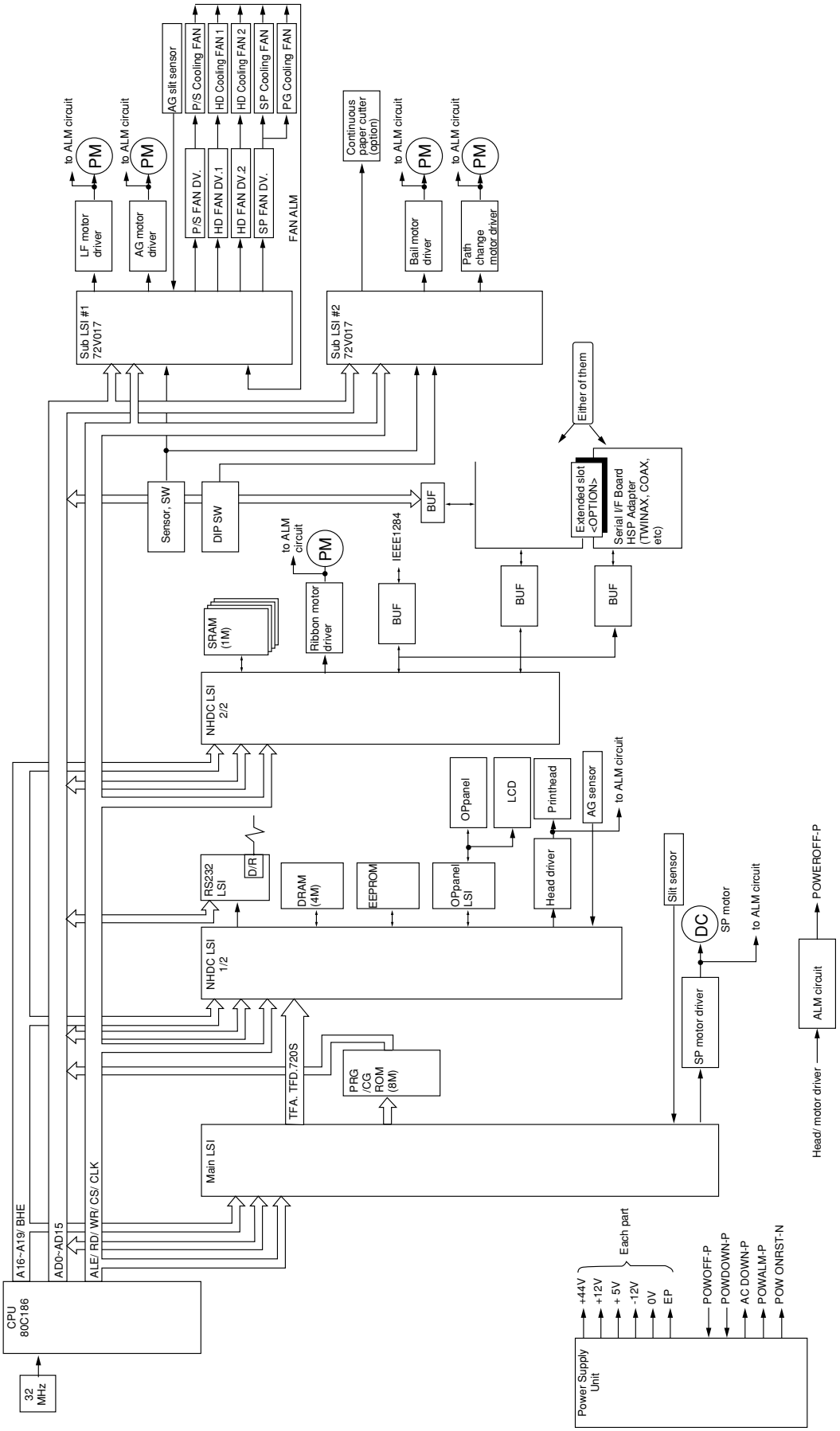
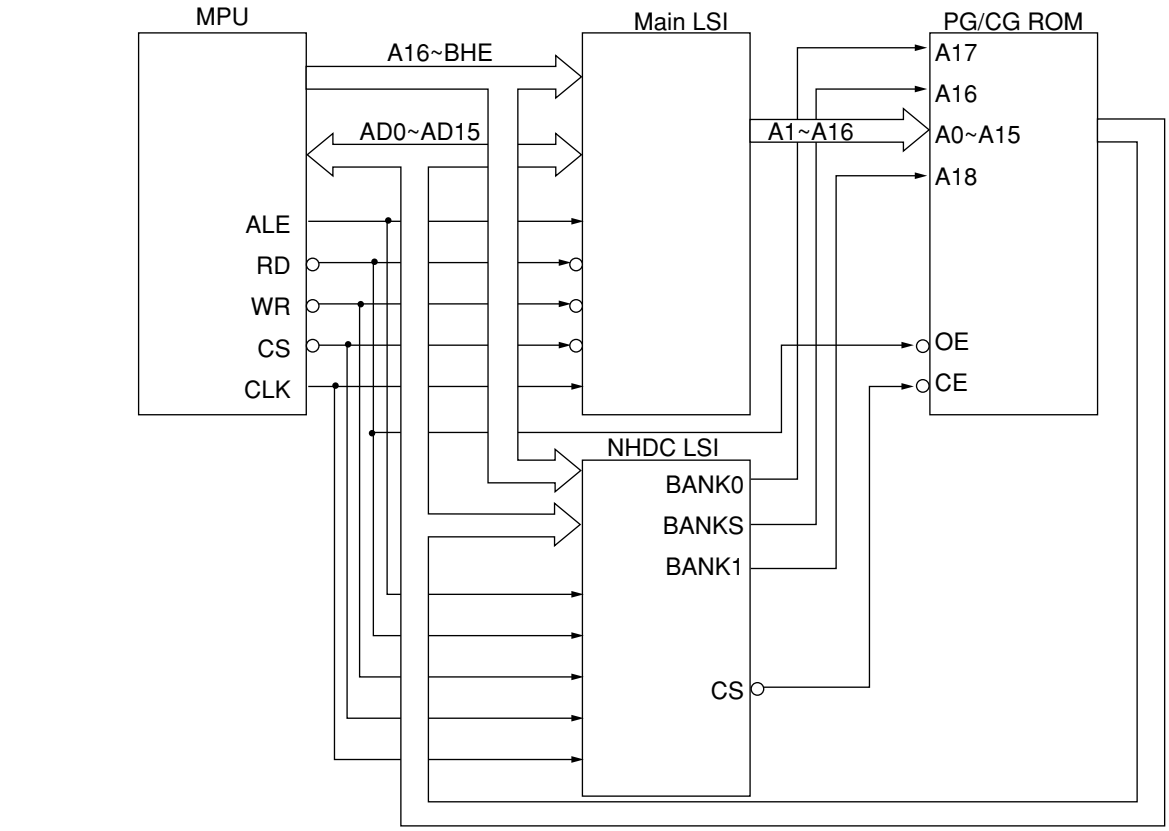

AG slit sensor
P/S Cooling FAN
HD Cooling FAN 1
HD Cooling FAN 2
SP Cooling FAN
PG Cooling FAN
to ALM circuit
PM
LF motor driver
AG motor driver
P/S FAN DV.
HD FAN DV.1
HD FAN DV.2
SP FAN DV.
FAN ALM
Continuous paper cutter (option)
Bail motor driver
Path change motor driver
Sub LSI #1 72V017
Sub LSI #2 72V017
Either of them
Sensor, SW
DIP SW
BUF
Extended slot <OPTION>
Serial I/F Board HSP Adapter (TWINAX, COAX, etc)
IEEE1284
SRAM (1M)
Ribbon motor driver
NHDC LSI 2/2
OPpanel
LCD
Printhead
AG sensor
RS232 LSI
D/R
DRAM (4M)
EEPROM
OPpanel LSI
Head driver
Slit sensor
DC
SP motor
NHDC LSI 1/2
SP motor driver
ALM circuit
POWEROFF-P
Head/ motor driver
TFA. TFD.720S
PRG /CG ROM (8M)
Main LSI
A16~A19/ BHE
AD0~AD15
ALE/ RD/ WR/ CS/ CLK
CPU 80C186
32 MHz
Each part
+44V
+12V
+ 5V
-12V
0V
EP
POWOFF-P
POWDOWN-P
AC DOWN-P
POWALM-P
POW ONRST-N
Power Supply Unit

Figure 2.1

(2) PG /CG ROM (IC47)

This is a 512 × 16 bits (8M bit) OTPROM with the control program for the printer and the font data for the characters stored. The MPU executes instructions under this program.
The PG/CG ROM is assigned to the program memory area of the MPU and is fetched by the RD signal of the MPU.
The following shows the operation of the memory access.



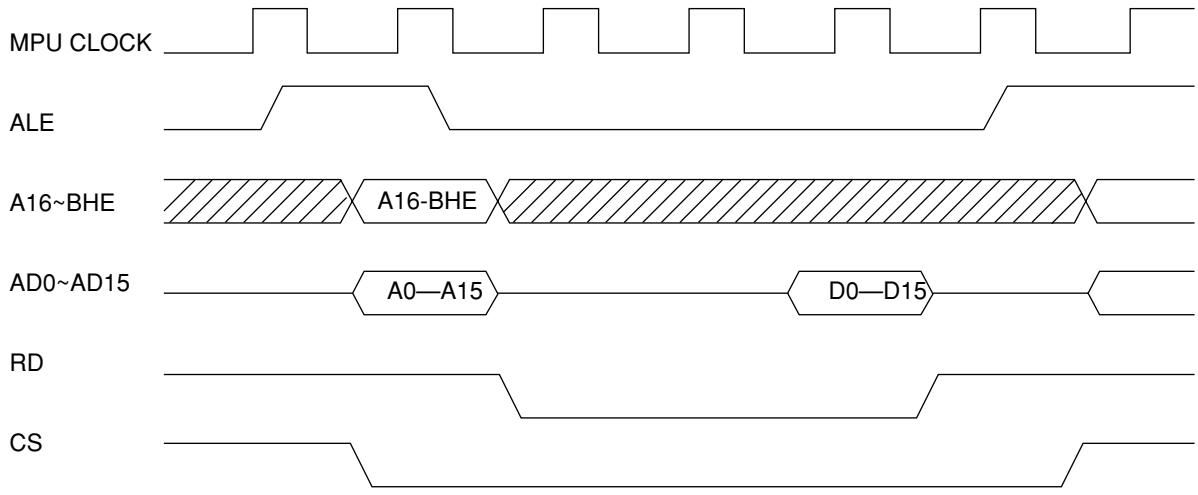


Figure 2.2

(3) DRAM(IC28)

The RAM is CMOS dynamic RAM with (256K × 16 bit) configuration, and used as buffers (such as receiving buffer, printing buffer, DLL buffer and working buffer).
The following shows the examples of the memory access operation.

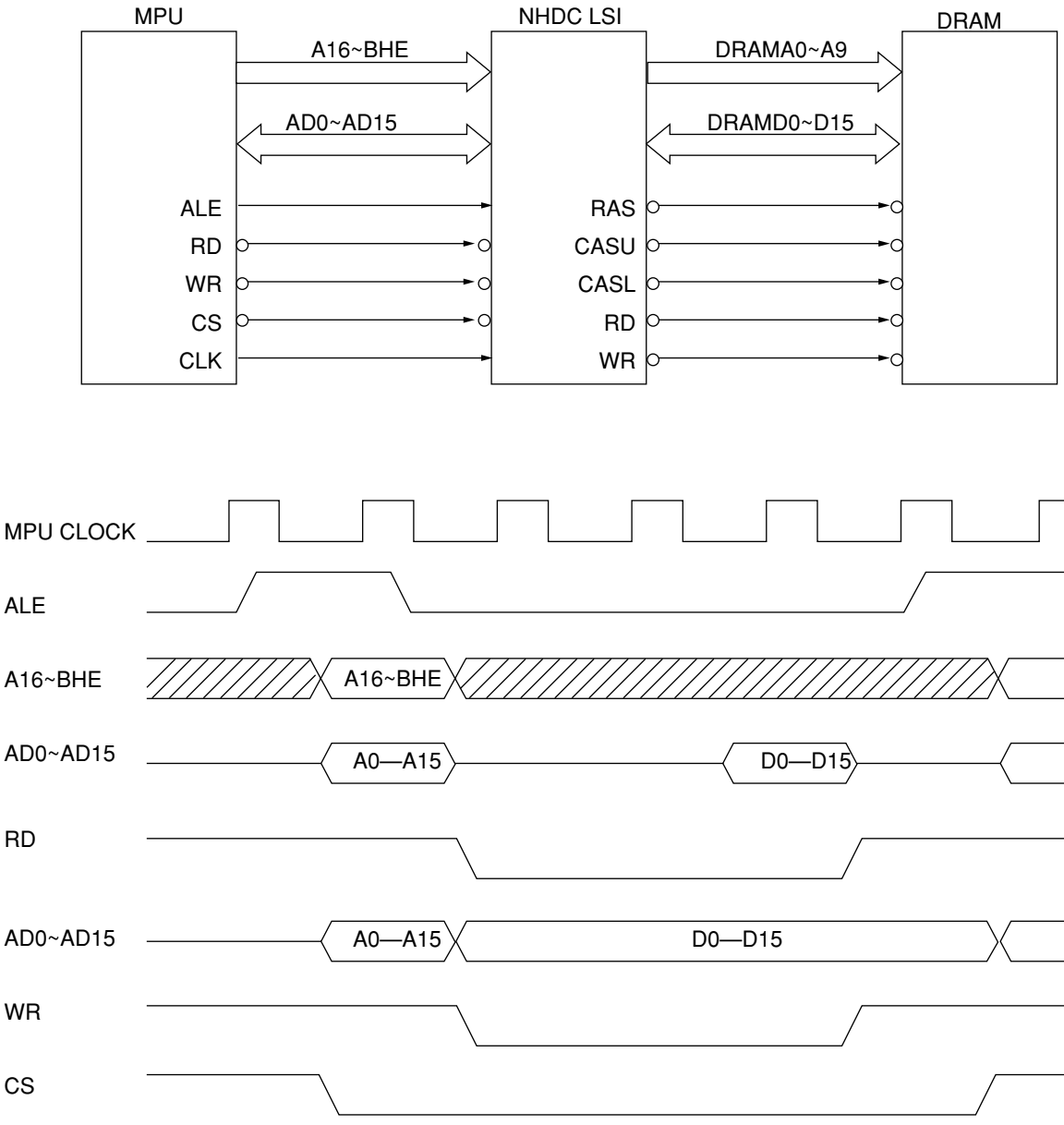


Figure 2.3

(4) EEPROM(IC40)

The EEPROM is a CMOS serial I/O type memory which is capable of electrically erasing and writing 1,024 bits.
The EEPROM contains menu data.
The following shows the memory access operation.

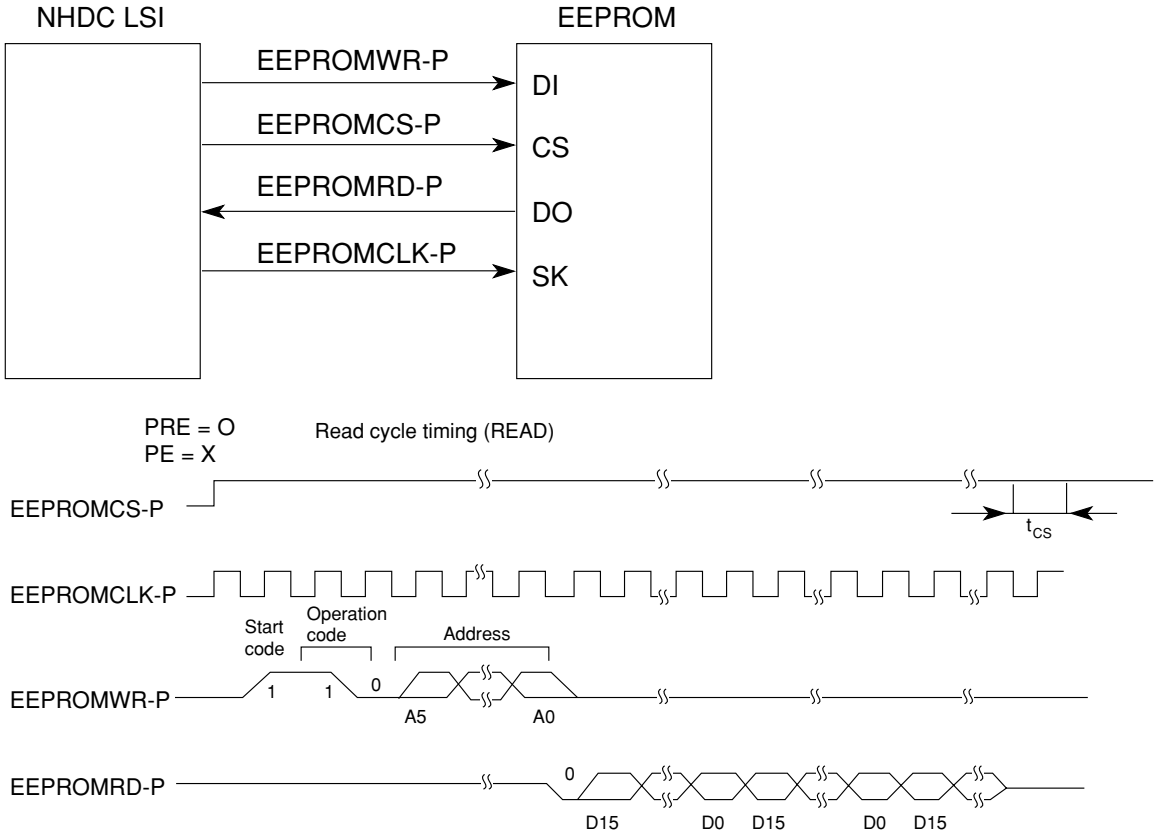


Figure 2.4

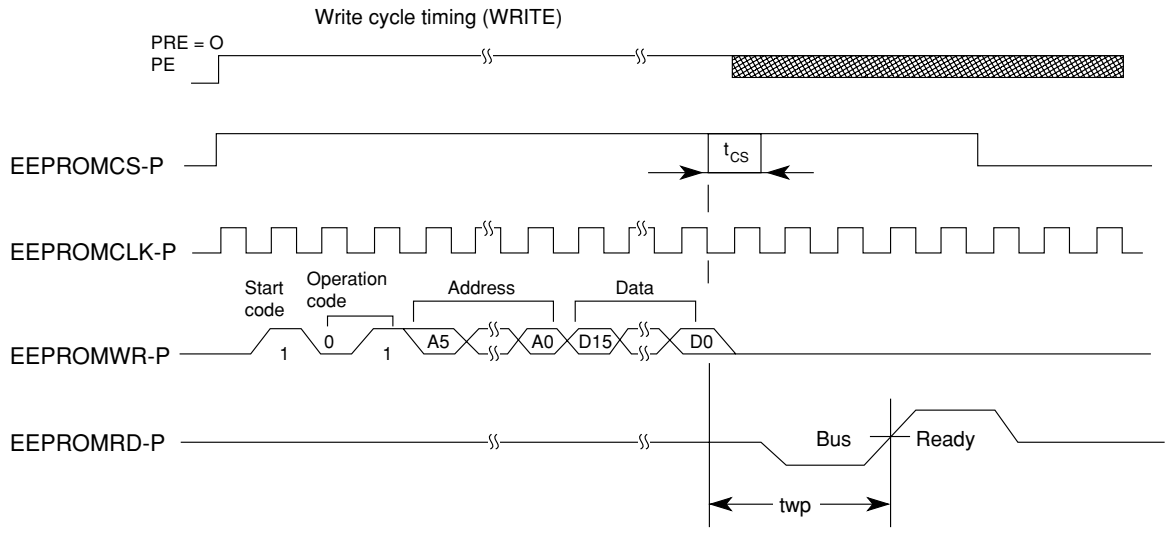


Figure 2.5

(5) Main LSI (IC38: MSM91U036)

MSM91U036 is control LSI for head data, DC motor and modification of print data, which has the following functions.

(a) Head data control
It distributes print data stored in the DRAM over wire arrangements of the print head and outputs it as dot data in synchronism with print timing. In this time, the distribution complies with each print mode which is specified by the MPU.

(b) Print timing control
It outputs the signals which control the print timing of ODD and EVEN pins on the print head.

(c) Space motor speed control function
It controls the space motor with micro-programs to accelerate/decelerate it.
This LSI also controls the speed of the space motor in agreement with each print mode.

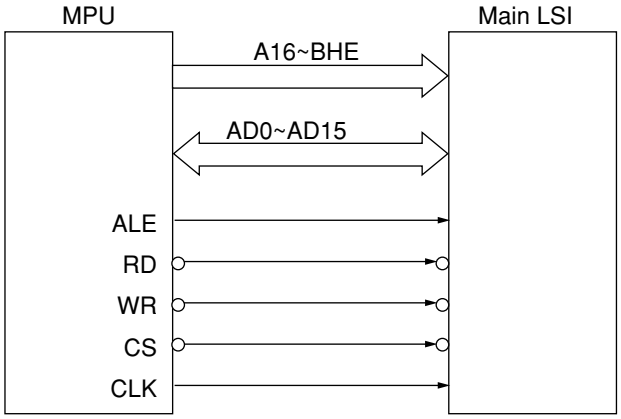
(d) I/O port
This printer has 8-bit output port which is used for controlling the SRAM.

(e) Head position count
It counts the outputs from slit sensors (SPPHASE A, B) located on the space motor to keep monitoring the current position of the print head.

(f) Print data modifying function
It modifies the print data stored in the DRAM with command inputs from the MPU.

(h) DMA control function
It outputs a DMA request to the MPU, simultaneously controlling the DMA.

This LSI is connected in multiplex to the MPU.


MPU
Main LSI
A16~BHE
AD0~AD15
ALE
RD
WR
CS
CLK

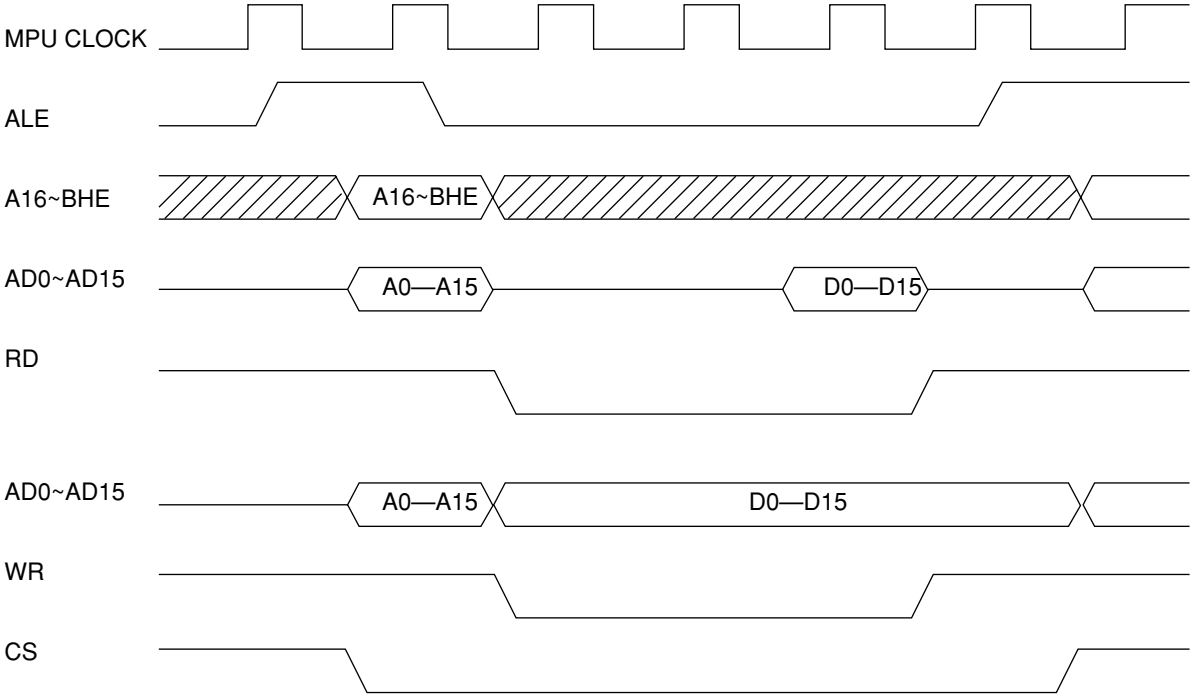

MPU CLOCK
ALE
A16~BHE
A16~BHE
AD0~AD15
A0—A15
D0—D15
RD
AD0~AD15
A0—A15
D0—D15
WR
CS

Figure 2.6

(6) NHDC LSI(IC27: TC190G08CF-7036)

This LSI controls timer, interruption, memories, printing, external interface, motor drive interface.

(a) Timer control
It controls the watchdog timer for detecting any out-of-control program, baud rate generator for setting the baud rate of the serial I/F, and pulse generation timer for AG plus count.

(b) Interruption control
It controls LSI inside interruptions, external interruptions and interruptions from an external interface as outputs for the MPU.

(c) Memory control
DRAM and SRAM control, chip select output control of ROM, flash memory and MUPIS, and bank switch control for expanding their memory spaces.

(d) Print control
It creates a print timing corresponding to the print DPI to control the possition and print correction for pins.
This also controls the print Mask and DMAC which reads print data from the memory and transmits it to the print output buffer.

(e) External interface
It controls various interfaces for main LSI, IEEE1284, serial I/F, Oki-HSP(MUPIS), OpePaneLSI, EEPROM.

(f) Motor drive interface
Each control of OVDV pulse generation for AG motor, generation of pulse for switching ribbon motor phase, and OVDV pulse generation for LF motor.

(7) Sub LSI (IC17, IC18: MSM72V017)

This LSI is the I/O port LSI which controls the input/output of various controlling signals with command inputs from the MPU.

(a) Sub LSI #1 (IC17: MSM72V017)
Input/output control for controlling signals to various sensors, FAN controlling signals, sensor slice level controlling signals, AG motor controlling signals, and LF motor controlling signals.

(b) Sub LSI #2 (IC18: MSM72V017)
Input/output control for controlling signals to various sensors, SP motor current controlling signals, external interface controlling signals, Path change motor controlling signals, bail motor controlling signals.

(8) Serial I/F LSI (IC35: Z8523008)

This LSI is the serial I/F LSI which controls the input/output of serial I/F controlling signals with command inputs from the MPU.

2.1.3 Initialization

This printer is initialized when the power is tumed on or when the I-PRIME-N signal is input from the host side via the parallel interface.
For the initialize operation, the RESET-N signal is first output from the reset circuit to reset the MPU and LSIs. When resetting ends, the program starts and the LSIs are reset by NHDC LSI via LRESET-N. Reset operation by I-PRIME starts program to initialize, but does not reset the MPU. The program here sets the mode of the LSI including the MPU, checks the memories (ROMs and RAMs), then carries out carriage homing, and determines the LF motor phase.
Finally, the program establishes the interface signals (P-I/F: ACK-P signal sending, and S-I/F: BUSY-N signal off) and lights the SELECT lamp to inform the ready state for receiving to the host side and ends the initialize operation.

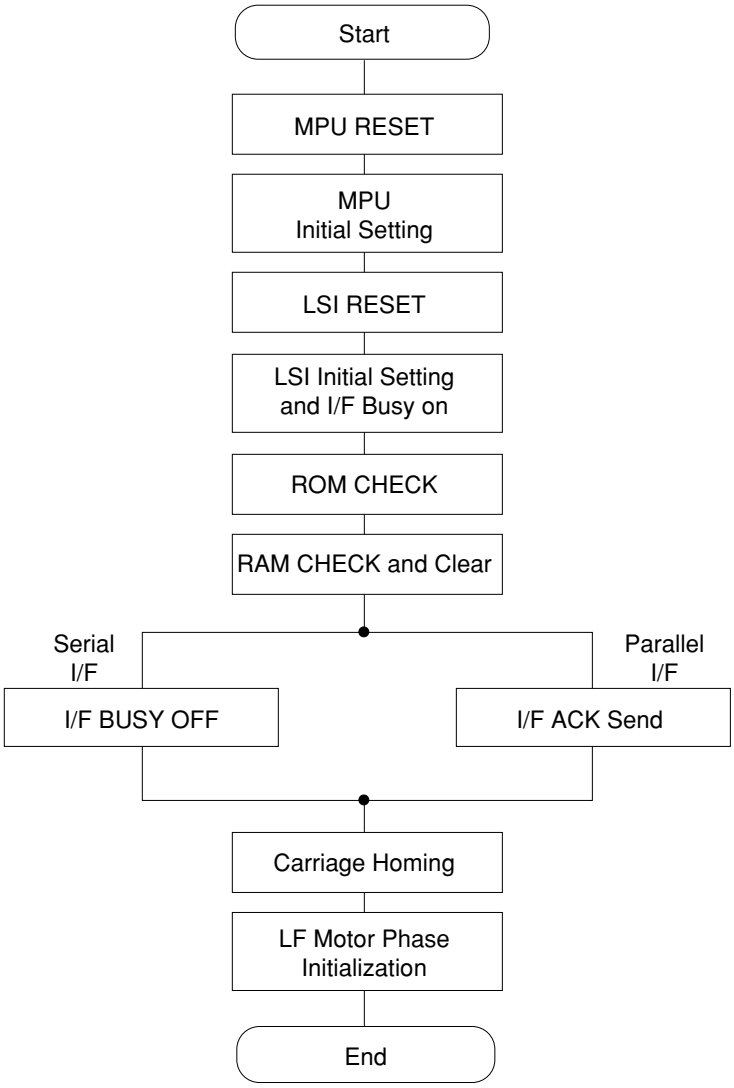


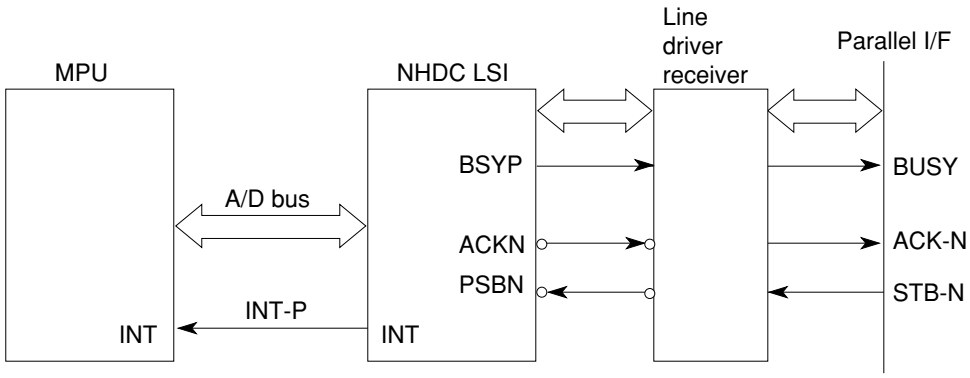
Figure 2.7

2.1.4 I/F control

The PM4410 is provided with the centronics parallel I/F and RS-232C serial I/F as standard features.Also, it can be connected to option Serial I/F Board. The interface cable can be connected simultaneously with these interfaces.
These interfaces can be switched with the menu switch on the operation panel, in addition, you can designate auto-select for them. The MPU communicates with hosts through the NHDC according to the selected interface mode. The selected interface is stored to the EEPROM and can maintain even after powering the printer off.

2.1.5 Parallel I/F Control

The Parallel data input from the host to the NHDC LSI is latched to its internal register at the falling or rising edge of the STROBE-N signal.
At the same time, the LSI sets the BUSY signal to the high level to inform the host that the data is being processed, and outputs the INT-P signal to inform the MPU of data reception. The data is read upon receiving the RD-N signal from the MPU.
When the data processing ends, the BUSY signal is set to off and the ACK-N signal in sent to request the next data. When reception is impossible because the buffer is full, the BUSY signal is sent to request stopping of data transmission.



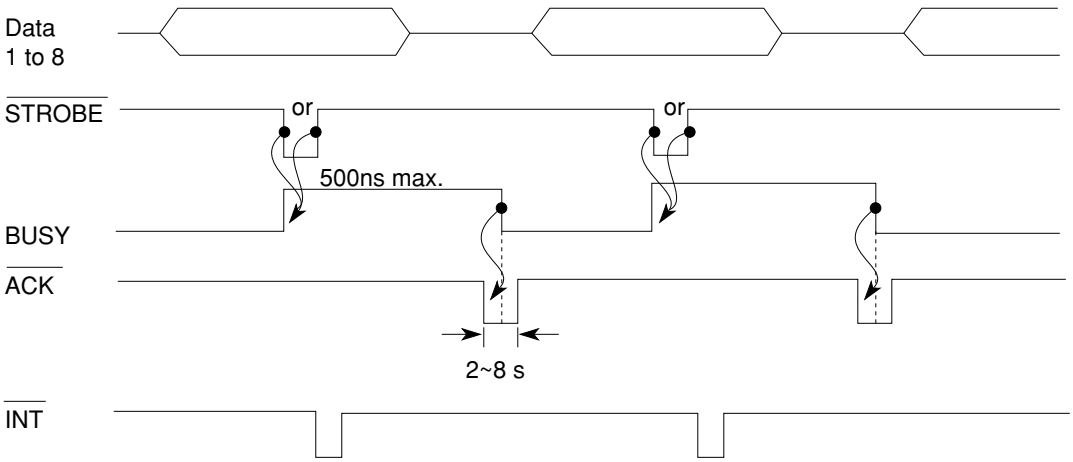


Figure 2.8

2.1.6 Serial I/F Control

The MPU sets the baud rate which is selected with the menu switch for the NHDC LSI and have the serial I/F LSI to output the clock frequency of the baud rate.
Input signals from the serial I/F (DSR, CTS, CD and RD) are converted into TTL level ones by the Line driver/receiver and input to the serial I/F LSI and NHDC LSI. The serial I/F LSI converts serial data into parallel data to output it to the MPU.
Output signals (DTR, RTS, SSD and TD) to the serial I/F are output from the MPU to the NHDC LSI and serial I/F LSI, and then converted through the Line driver/receiver into line voltage which is output to the serial I/F.

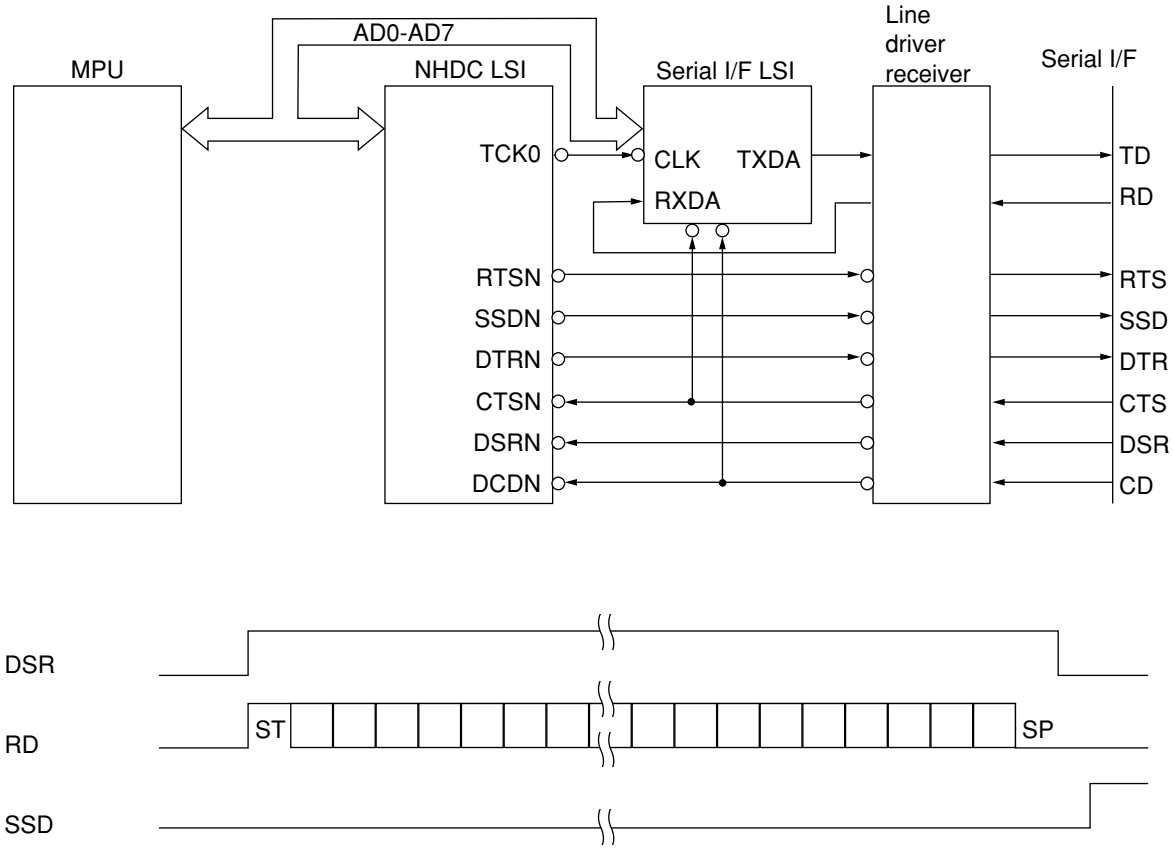


Figure 2.9

2.1.7 Printing operation

The time chart for the spacing and printing, line feed operations are as shown below.

The spacing, printing and line feed operations are controlled by the MPU. The MPU also controls the entire timing of these operations.

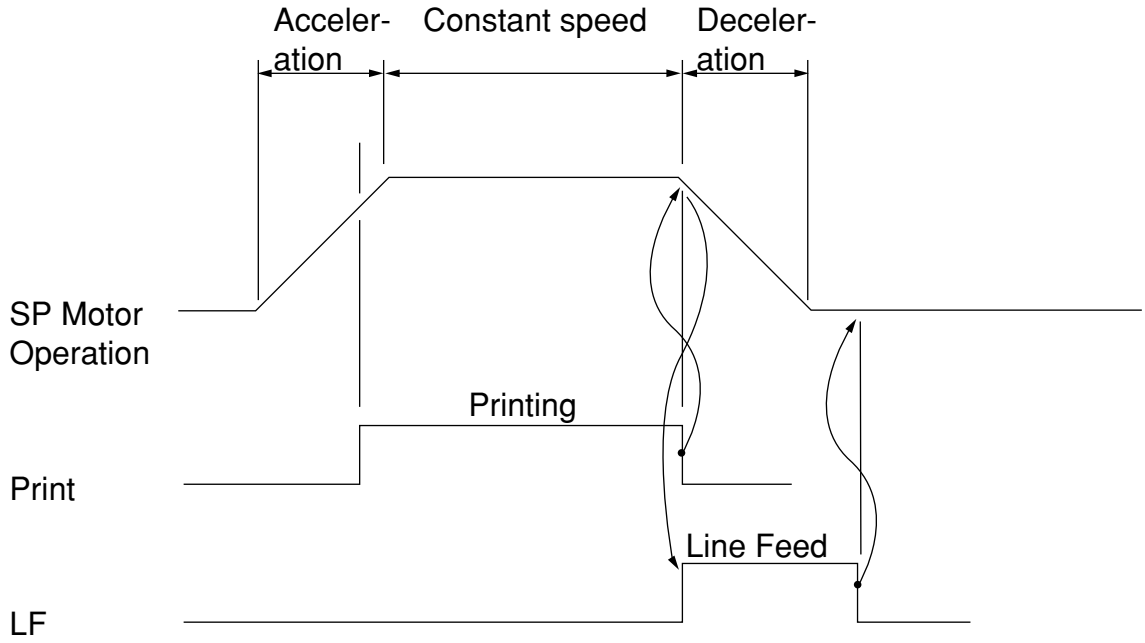


Figure 2.10

When starting the printing operation, the MPU specifies the distance moved, print start position, printing speed, etc. to the LSI, and activates the spacing motor. The MPU, when the carriage arrives at the print position specified, activates the printer to start printing, and when printing terminates, the MPU activates the line feed motor for line feed operation. During the line feed operation, the MPU causes the carriage to decelerate. Upon termination of line feed operation, the spacing operation is performed.

2.1.8 Printhead control

The printhead is controlled by the Main LSI and NHDC LSI.

Printing is synchronized with the ITOUT signal from the NHDC LSI.

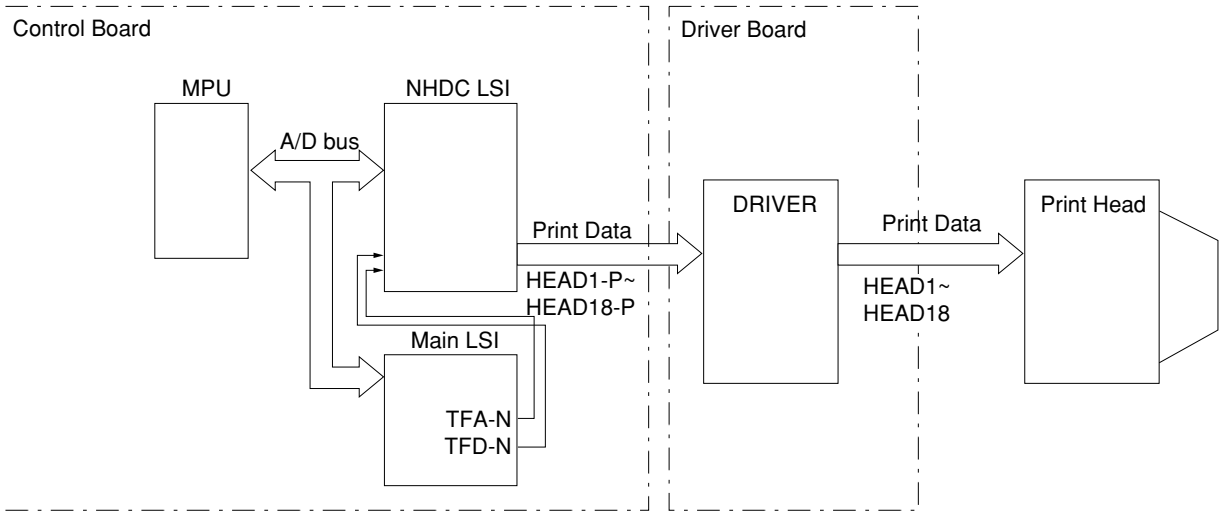


Figure 2.11

The NHDC LSI outputs the dot timing1 signals (DT1:1~18) and the dot timing2 signals (DT2:1~18), and the driver IC drives each dot magnet. These signals are output from the NHDC LSI after the following corrections for final driving time determination inside the LSI:

(1) Correction for the number of pins driven

The driving time is corrected according to the number of pins driven at the same time out of 18 pins.

(2) Correction according to adjacent pin drive timing

The driving time is adjusted by checking whether the pin adjacent to the pin to be driven is driven on the previous timing.

(3) Correction for head gap

The driving time is corrected according to the head gap.

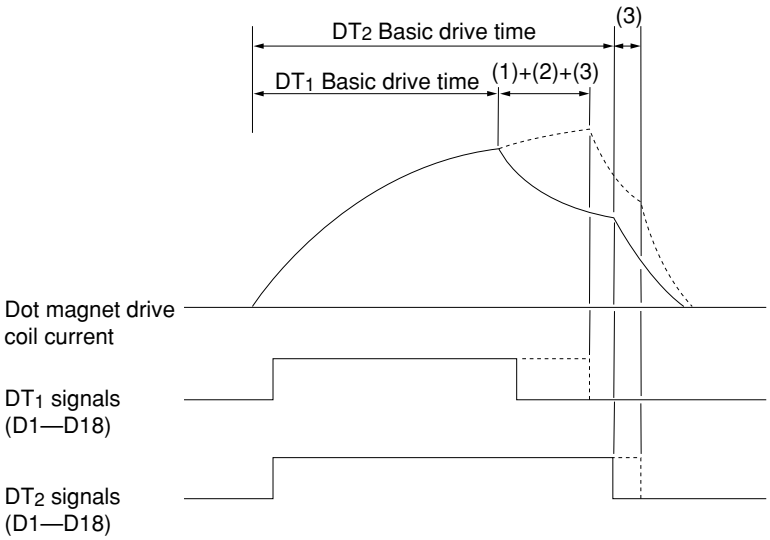


Figure 2.12

2.1.9 Print Compensation Control

The print compensation can be made as shown below:

(a) Simultaneous Compensation of the number of impact pins
The NHDC LSI is provided with the compensation table for each pin to make necessary compensation.

Number of impact pins	Few ⟷ Many
Drive time	Short ⟷ Long

(b) Duty control
1. If the number of the lines which exceeds 60% printing duty is continuous 8 lines, the printer starts 2-path printing at the 8th line.
2. If the printer can activate 12 pins simultaneously in a line, it 2-path prints the line.

(c) Temperature compensation (See2.1.14 "Alarm Circuit.")

(d) Print mode compensation
According to the thickness of the printing medium, the print mode is compensated as shown in the table below:

Head Gap Range	1	2	3	4	5
Print speed	100%	97%	95%	90%	89%
Drive time	Short ⟷ Long				

(Drive time lengthens at each step.)

2.1.10 Space motor control

(1) The Main LSI generates the SPDV-P signal upon receiving the spacing command from the MPU. This is a fixed cycle pulse signal.

The Main LSI varies the pulse duty according to the speed data from the MPU to control the motor speed.

The SPFOW-P or SPREV-P signal from the Main LSI changes the current direction in the DC motor to run the motor in the forward or reverse direction.

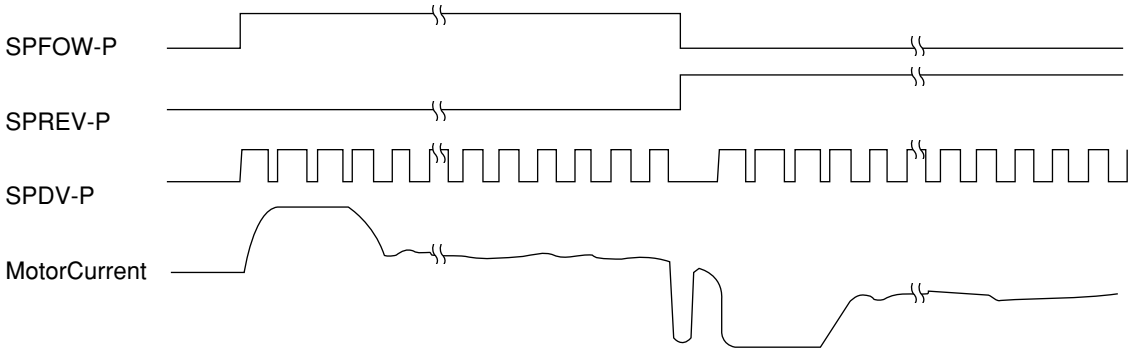


Figure 2.13

(2) Slit encoder

As the space motor rotates, it generates feedback pulse signals SPA-P and SPB-P. The Main LSI detects the edge pulses from these signals and multiplies the frequency to output the S720-P signals as the normalized timing to NHDC LSI to generate head drive timing.

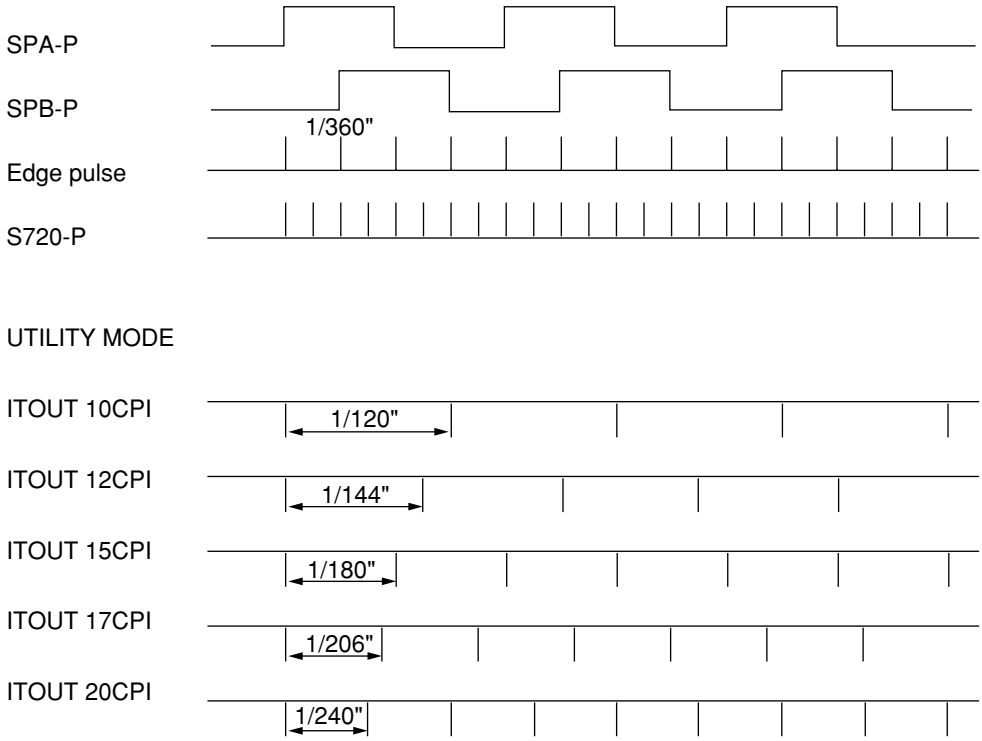


Figure 2.14

2.1.11 Line feed

The LF motor is locked by the current supplied from +12V according to the pulse duty of the LFCHOP-P signal during the stop period.

It is driven by +44V application by the LFOVDV-P signal for line feed operation.

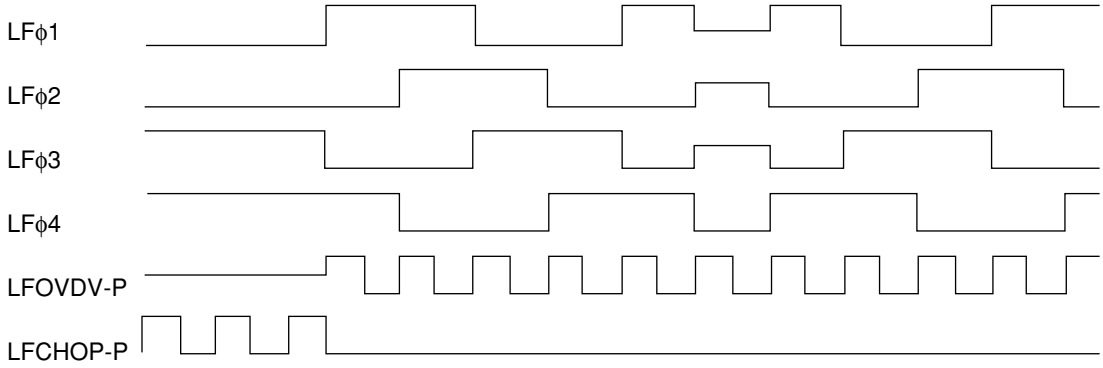


Figure 2.15

2.1.12 Bail, Path change, AG, ribbon motor control

Bail, Path change, AG and ribbon motor control is as shown below.
The AG motor is locked with AGHOLD-P.

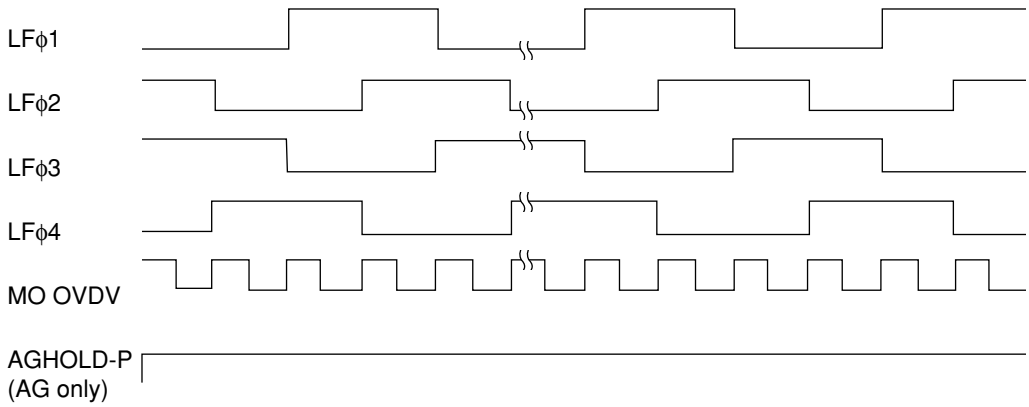


Figure 2.16

2.1.13 Operation Panel

The clock synchronization OPCLK of NHDC LSI is used to input the switch data and output the LED data and LCD data through the operation panel control LSI (IC1: BU6152S).

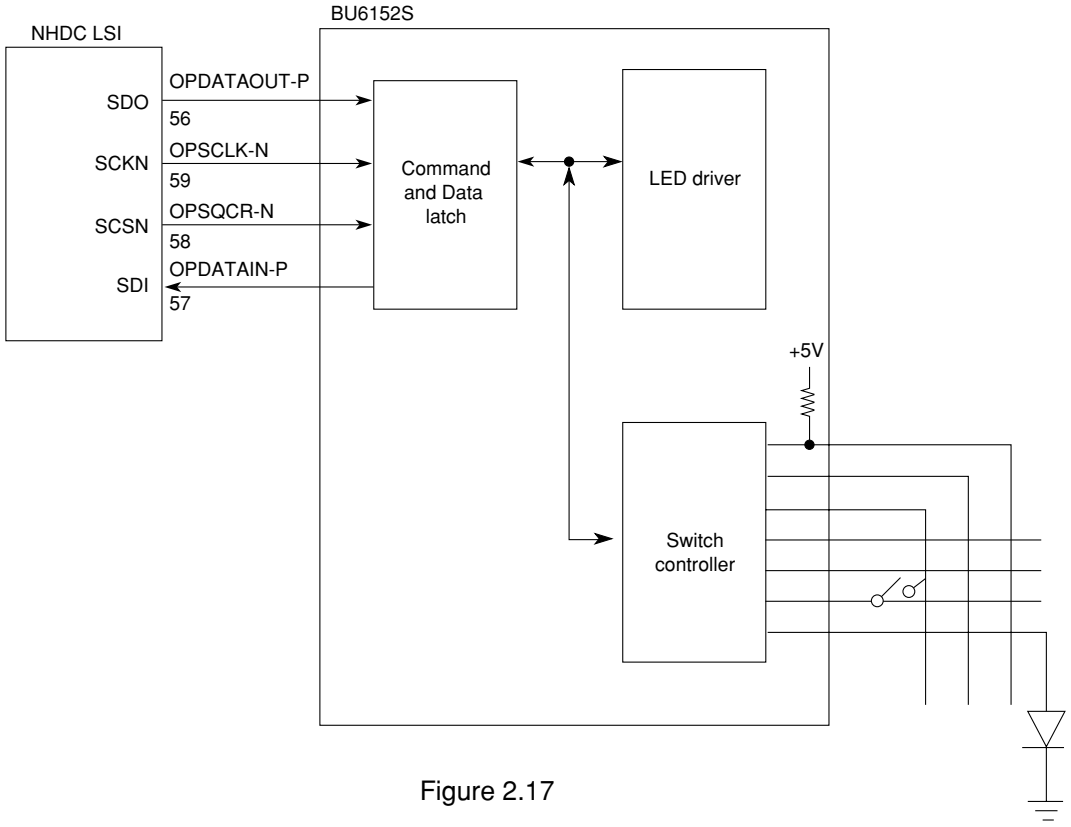
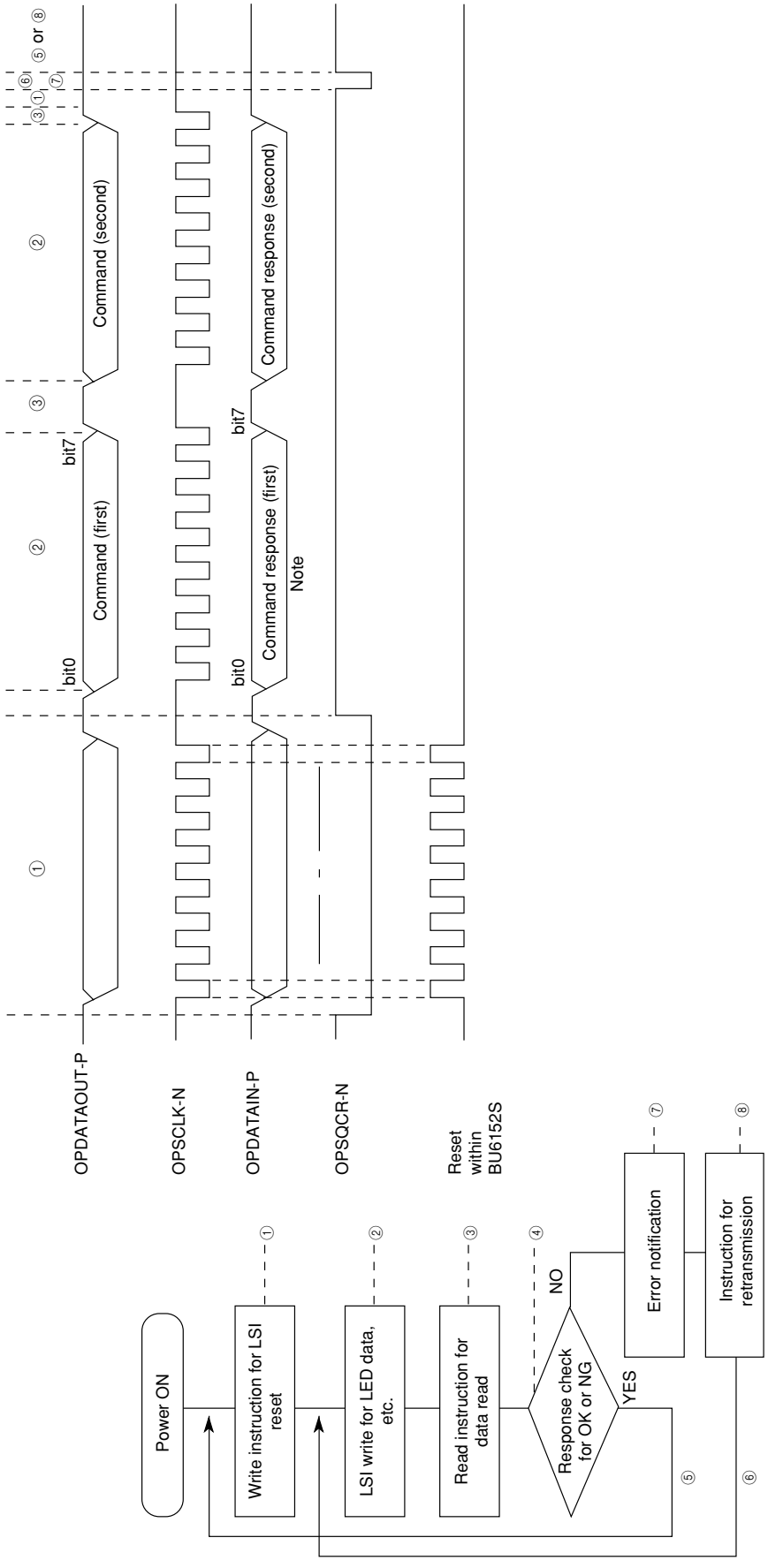


Figure 2.17

A 2-byte (15 bits + 1 even parity bit) command (OPDATAOUT-P) is transmitted to the LSI (BU6152S) in synchronization with the OPSCLK-N signal. The LSI decodes this command and when it is found to be legal, returns a 2-byte command response back to the NHDC LSI which includes data on Switch information, LED status, LCD status receive command ACK/NAK and 1 odd parity bit.

Any transmission errors found cause the command to be reissued after the transmission of the OPSQCR-N signal.



Note: From the illustration above, you can see that the command and the command response are output at the same time. This is because the bit 0 to bit 3 of OPDATAIN-P are fixed so that the response can be returned before decoding the command.

Figure 2.18

2.1.14 Alarm circuits

(1) Driver circuit abnormality detection alarm.

This protective circuite prevents secondary troubles by stopping the power supply upon detection of an abnormality in the print head, SP motor driver circuit or other motor driver circuits.

This circuit monitors the driving time by means of the signals (DT1COM1, SPV, LF COM, AG-MCOM, RBN-MCOM, TR-MCOM, BEIL-MCOM and RENCOM) connected to the overdrive signals for each driver circuit. If any driver circuit driving time exceeds the specified time, the POWOFF-P signal is output to switch off the power supply to stop all DC voltage outputs.

(2) Head high temperature alarm circuit

The thermistor built in the head monitors the head temperature for head coil protection.

If high duty printing continues for a long time, the head temperature rises. If it reaches a certain level (approx. 148 °C and 158°C), head high temperature alarm 1 is detected to start one-way printing with a 40 ms interval after each line. When head temperature alarm 2 is detected to start one-way and two-pass printing with a 1.2 sec. interval after each line for the head temperature to fall. When the temperature falls to below the detection temperature, normal printing operation restarts.

As the head temperature rises, the resistance of the thermistor decreases and the potential of the input to the comparator in the head thermistor alarm circuit rises, when the potential goes above the alarm 1 specific level, MPU goes into alarm 1 procedure, simultaneously MPU continues to check if the potential goes above alarm 2 specific level. When going below alarm 2 level, MPU goes into alarm 2 procedure.

(3) Paper end detection circuit

Five sensors (front tractor paper end sensor, rear tractor paper end sensor, sheet jam sensor, sheet top sensor and sheet width sensor) are provided for different paper set routes to monitor paper end. When paper runs out, the corresponding sensor is turned off to input the FTRPESW-P, RTRPESW-P, SHEETJAM-P, SHEETTOP-P, SHEETWITH-N signal to the sub LSI (IC17), and is read by the MPU. The MPU stops the printing operation, informs the host of the paper end and jam, and lights the alarm lamp.

(4) Cover open alarm circuit

When the front access cover is PUSH opened, the COVEROPN1SW-P signal is input to the main LSI and the NHDC LSI from the cover open microswitch, and an invalid signal is input to MPU. The MPU stops the printing operation as soon as possible, informs the host that receiving is impossible, and lights the alarm lamp.

When the front access cover is opened and, the interlock switch cuts the SP motor drive current and makes the SP motor stop.

(5) Fan alarm circuit

For each of the five fans, the FANALM-P signal is provided to detect fan rotation/stop. The signal is at Low level when the fan rotates, while it becomes High when it stops. The MPU monitors this signal level. When the High level is kept for one minute or longer, the MPU stops the printing operation, informs the host of the fan alarm, and lights the alarm lamp.

(6) Head thermistor short/open alarm circuit

The head thermistor voltage is monitored physically. When short or open circuit occurs, the HDTHALM-N signal is input to the sub LSI (IC18) and read by the MPU. The MPU stops the printing operation, informs the host of the short/open alarm, and lights the alarm lamp.
When the head is unloaded, the head thermistor becomes open, resulting in this alarm.

(7) SP motor thermal alarm circuit

The voltage at the thermistor, built in the SP motor encoder block, is monitored physically. When temperature higher than the specified level is detected, the SPTHACM-N signal is input to the sub LSI (IC18) and read by the MPU. The MPU starts printing with an approx. 0.2 sec. interval after each line to cool down the printer.
When the temperature becomes lower than the specified, normal printing will be resumed.

(8) Fuse alarm circuit

Fuses are mounted on each of the SP motor and the other pulse motors, including LF motor, where the voltage level is monitored physically. When one or both of the fuses on the main control board are blown, the FUSEALM-P signal is input to the sub LSI (IC18) and read by the MPU. The MPU stops the printing operation, informs the host of the fuse alarm, and lights the alarm lamp.

(9) Ribbon jam alarm circuit

The rotation detection knob mounted on the ribbon cassette synchronizes with ribbon rotation and detects the rotation using the sensor. The RBNSEN-P signal from this sensor is input to the sub LSI (IC17) for the MPU to monitor the rotation. With no rotation for 16 sec. or longer, the MPU stops the printing operation, informs the host of the ribbon jam, and lights the alarm lamp.

2.1.15 Power supply circuit

This switching type power supply circuit supplies the +5 VDC, ±12 VDC and +44 VDC.

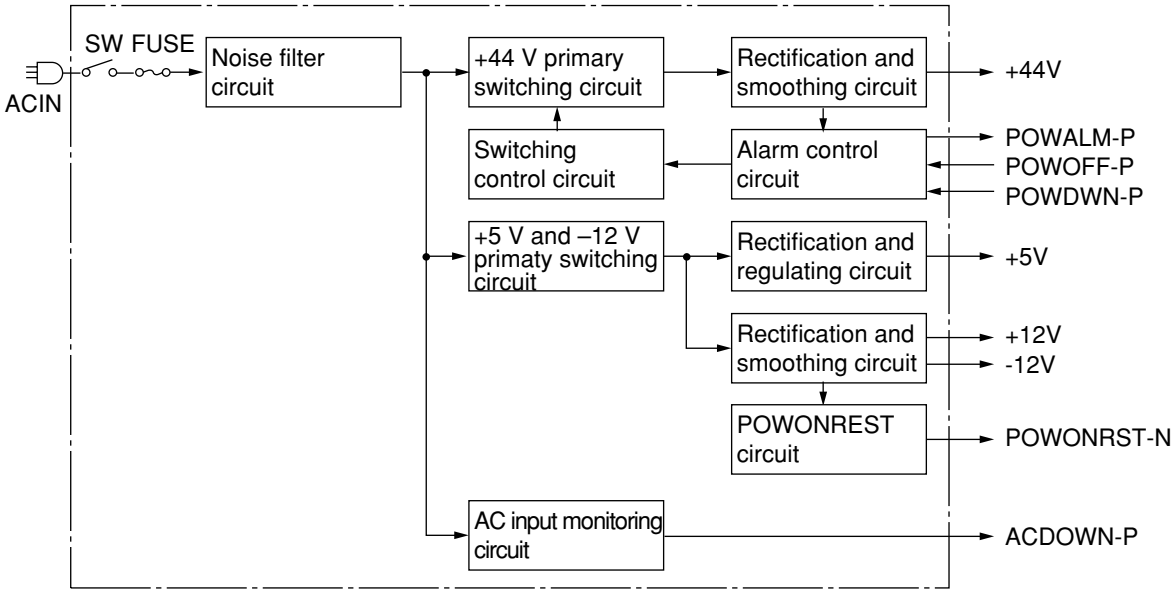


Figure 2.19

The uses of output voltages and signals are described below.

Voltage/ signal	Use
+5V	Logic IC/ LED drive voltage
+12V	Logic IC drive voltage, option interface line voltage and LF motor locking voltage
-12V	Option interface line voltage
+44V	Printhead, SP motor, LF motor, Other motors drive voltage
POW ALM-P	Out put from the power supply circuit upon detection of an abnormal temperature rise in the power supply circuit or an overcurrent of +44V. The control unit suppresses the overcurrent by two-pass printing. If the output does not change, the power supply circuit shuts off all DC output.
POW OFF-P	Output from the control board upon detection of an abnormality in the print head, SP motor, LF motor, Other motor driver circuit, and shut all DC output off.
AC DOWN-P	Output from the power supply circuit to the control board upon detection of no AC input with the AC switch turned off. Then the control board outputs thePOWOFF-P signal to the power supply circuit to have the necessary information written into EEPROM.
POW DWN-P	Output from the control board to the power supply circuit upon detection of no host or operator access for approx. 10 min., to start the power-save mode. In this mode, the power supply circuit cuts off 44V output.
POW ONRST-N	Output form the power supply reset circuit to the control board. On receiving the POWONRST-N signal, the control board prepares the control board RESET-N signal and +5VD.

2.2 Mechanical Operation

2.2.1 Printhead mechanism and operation

Teh printhead is a spring charged 18-pin driving head using a permanent magnet. It is attached to the carriage, which moves in parallel with the platen. Electrically, this unit is connected to the control circuits through the control board.

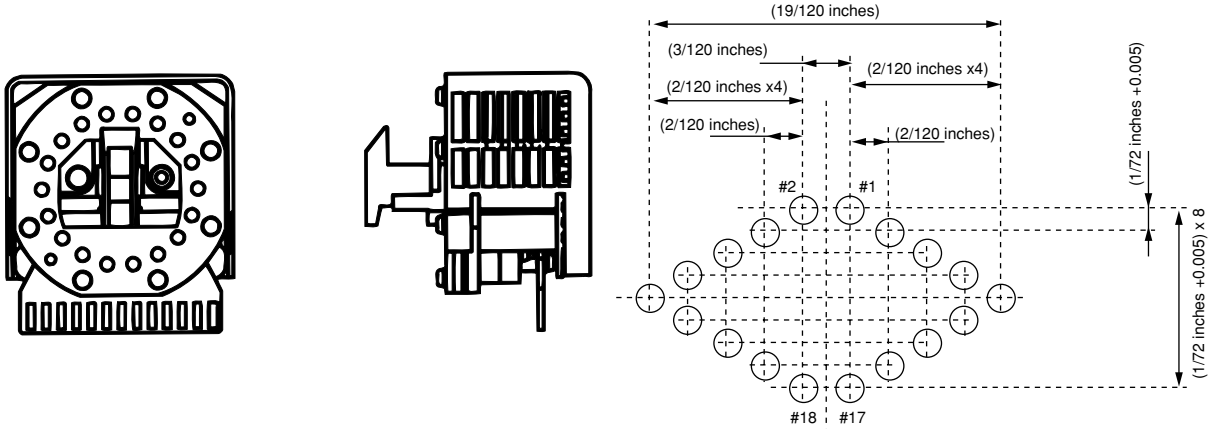


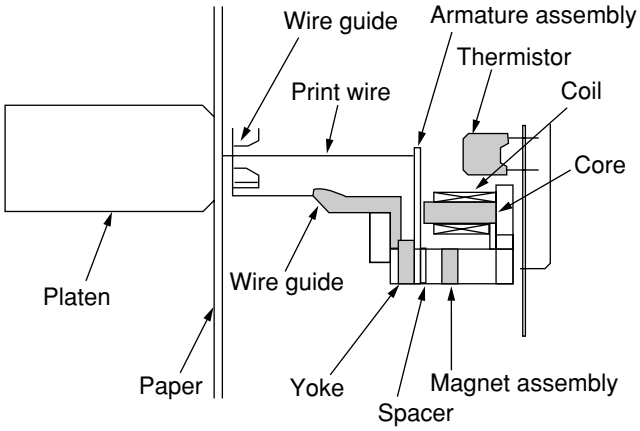
Figure2.20 Arrangement of the head pins
View from the tip of the printhead

(1) The printhead configuration:
The printhead is composed of the following parts:
(a) Wire guide
(b) Armature assembly (Wire, Armature, Spring, Yoke, Spacer)
(c) Magnet assembly (Magnet, core, coil, Yoke)
(d) Printed circuit board

(2) Motion of Printhead

The armature usually looses the armature sprint with a permanent magnet, making it to be attracted by the core. In this time, the print wire integrated with the armature is also in reset state, When the magnet coil is energized by a print command sent from the device controller, a magnetic flux will generate in the opposite direction against that of the permanent magnet and a restoring force of the armature in the opposite direction against the core, and then the print wire impinge on the platen. There is a paper and ink ribbon between the platen and print wire, so this impinging motion allows the ink of ink ribbon to be transferred (printed) to the paper.

(i) When printing



(ii) When not printing

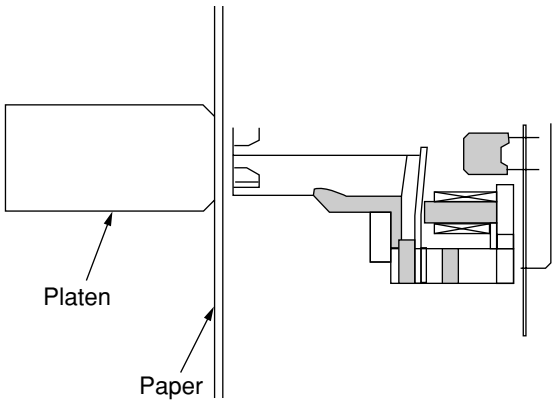


Figure 2.21

2.2.2 Spacing operation

Spacing is effected by driving the carriage assembly installed to the main shaft and slide beam set in parallel with the platen by the DC servo motor.

(a) DC motor with motor
(b) Carriage frame
(c) Carriage shaft
(d) Space belt
(e) Sensor
(f) Encoder disk

(1) Spacing operation

The carriage mounting the printhead moves in parallel with the platen along the main shaft and slide beam. The carriage is fixed to the mini pitch belt under the carriage frame.

When the DC servo motor runs clockwise as viewed from its front side, the driving force is transmitted to the mini pitch belt and the carriage moves from the left to the right. The DC servo motor rotating angle and speed are controlled by the count of øA and øB signsls (with a phase difference of about 90°) from the encoder and the time intervals of the signals. The rotating direction is determined by the sign (positive or negative) of the phase difference between øA and øB.

The mechanism is designed so that the carriage moves 2.22 inches (56.44 mm) when the DC servo motor makes one revolution.

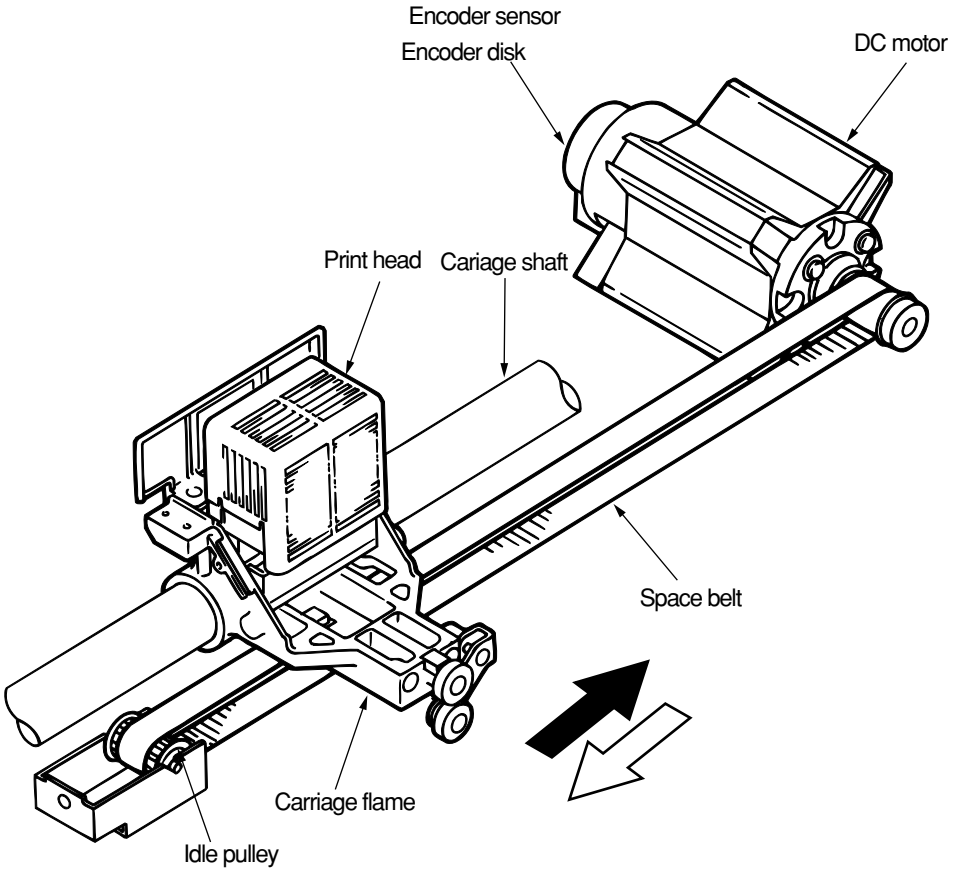


Figure 2.22

2.2.3 Head gap adjusting

The auto gap adjusting mechanism automatically adjusts the space between the platen and print head according to the thickness of papers. This mechanism does this driving the platen back and forth with the AG motor (pulse motor), and effects the auto gap motion after the reverse motion of the platen. The platen is reversed at power on or off line when cover open or paper end is detected, and the auto gap adjusting motion is performed when the printer returns to on line.

When the printer is shifted to off line at power on or detection of paper end, the platen reverses to the position that the space to the print head becomes wider than the thickness of paper (gap open position).

As the off line mode is released, shifted to on line after platen reverses, the AG motor drives the platen to the direction that the space between the print head and platen becomes narrower.

The rotational force of tha AG motor moves the platen to the print head (in the direction that the space becomes narrower) through various idle gears and adjusting cam.

After that, the AG plate impinges on the paper, and the AG frame is deflected, changing the core gap of the auto gap sensor located on the AG frame. When the change of the core gap is detected, the AG motor stops rotating.

Next, the AG motor reverse-rotates only a fixed step and stops. This allows the platen move backward, obtaining an proper space with the print head.

The forward an backward motion of the platen is driven by the adjusting cam being rotated, and the platen is always pulled to the reart of the unit by the spring.

(1) AG detection mechanism

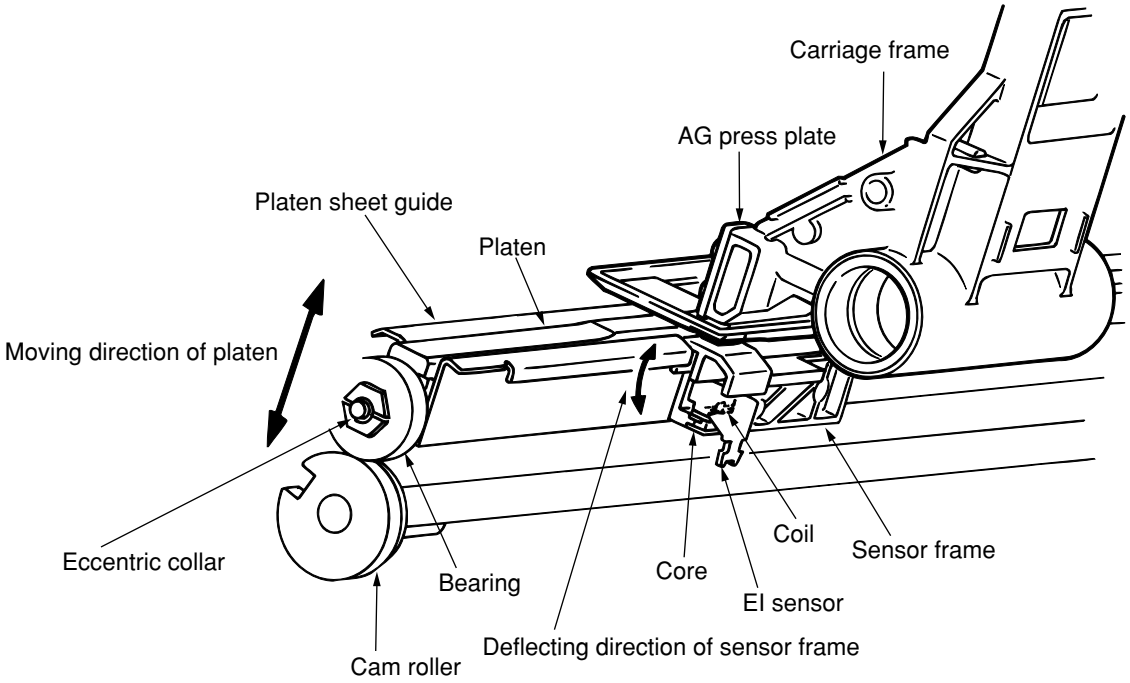


Figure 2.23

(2) AG sensor slit disk driving mechanism

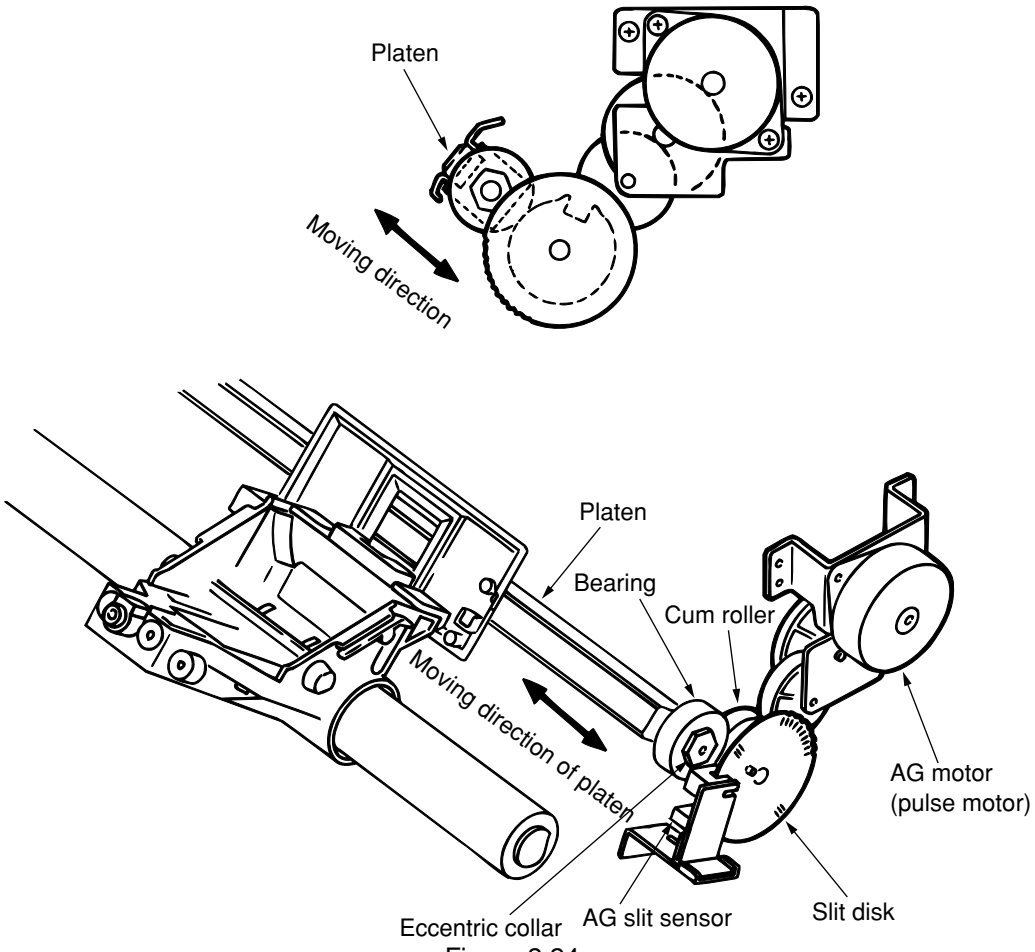


Figure 2.24

(3) AG detector detail drawing

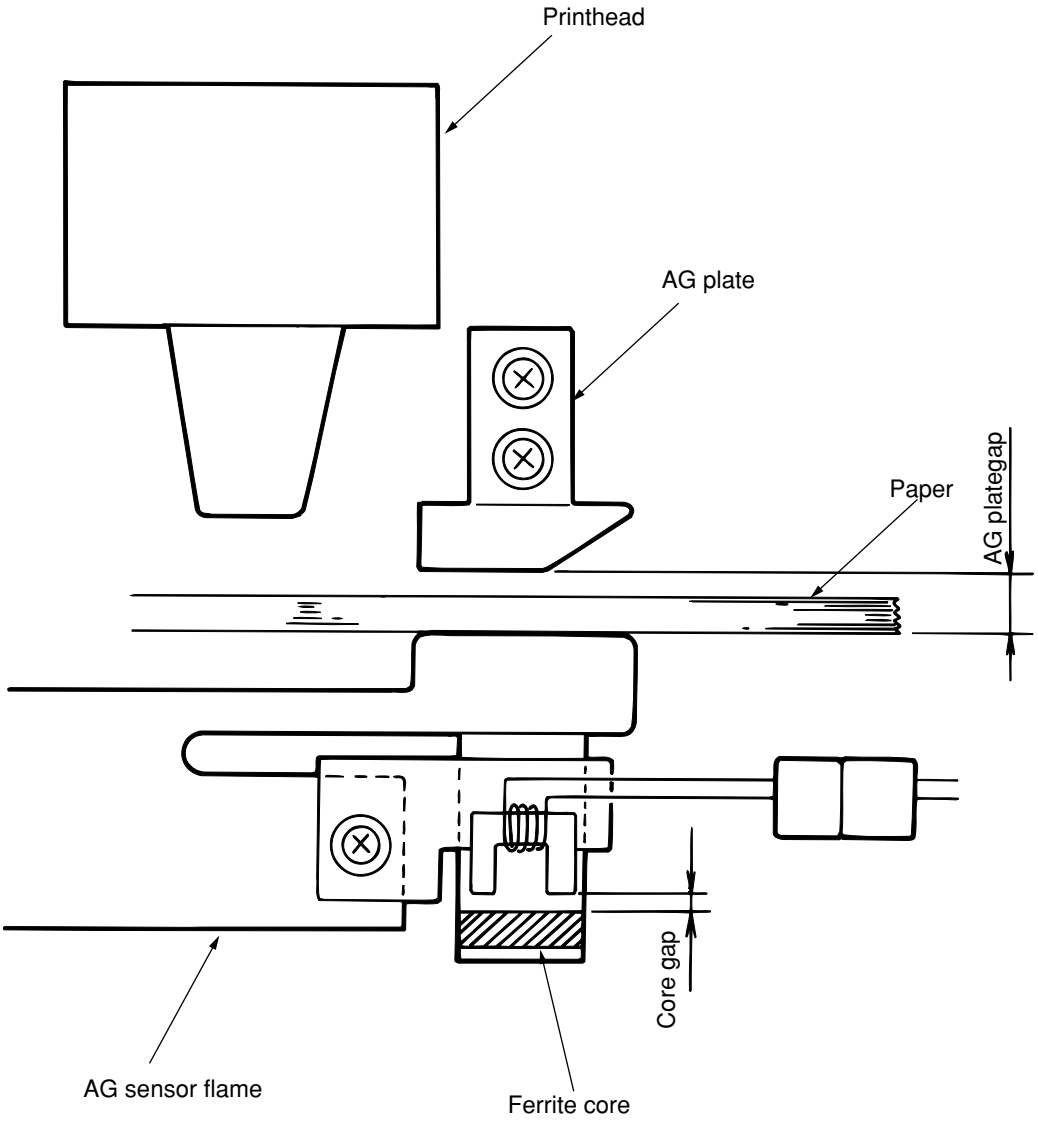


Figure 2.25

2.2.4 Ribbon Feed Mechanism

The ribbon feed mechanism feeds the ink ribbon and functions by driving the ribbon motor (pulse motor).

(1) Ribbon cartridge
This has a mechanism of capable of printing clear characters at all times by using a one-way-feed endless ribbon.

(2) Feeding
The ribbon feeding mechanism starts running regardless of whether the printer is printing or not, and stops at the same time when the spacing motion stops.
When the ribbon motor is driven, the rotational force is transmitted to the drive roller in the ribbon cartridge through ribbon feed gears, and the ink ribbon fed.

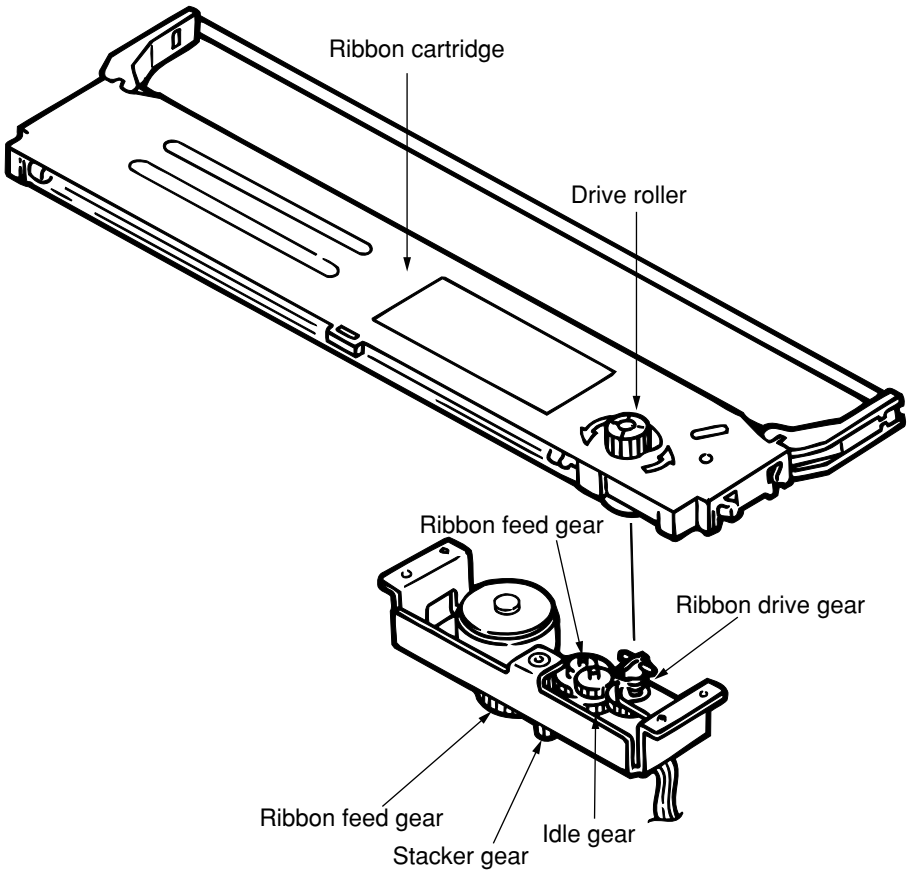


Figure 2.26

2.2.5 Paper Feed Mechanism

The line feed on the print paper is driven by the LF motor (pulse motor) and done by rotating the sheet feeder and feed roller.

(1) Front tractor
The rotation of the LF motor rotates the drive shaft through the LF gear, change gear and front tractor drive gear, driving the pin belt of hte front tractor Assy. This feeds a continuous paper set on the pin belt. Simultaneously, this drives the feed roller F/R through the mini-pitch belt following LF gear to carry the in synchronization with the tractor.

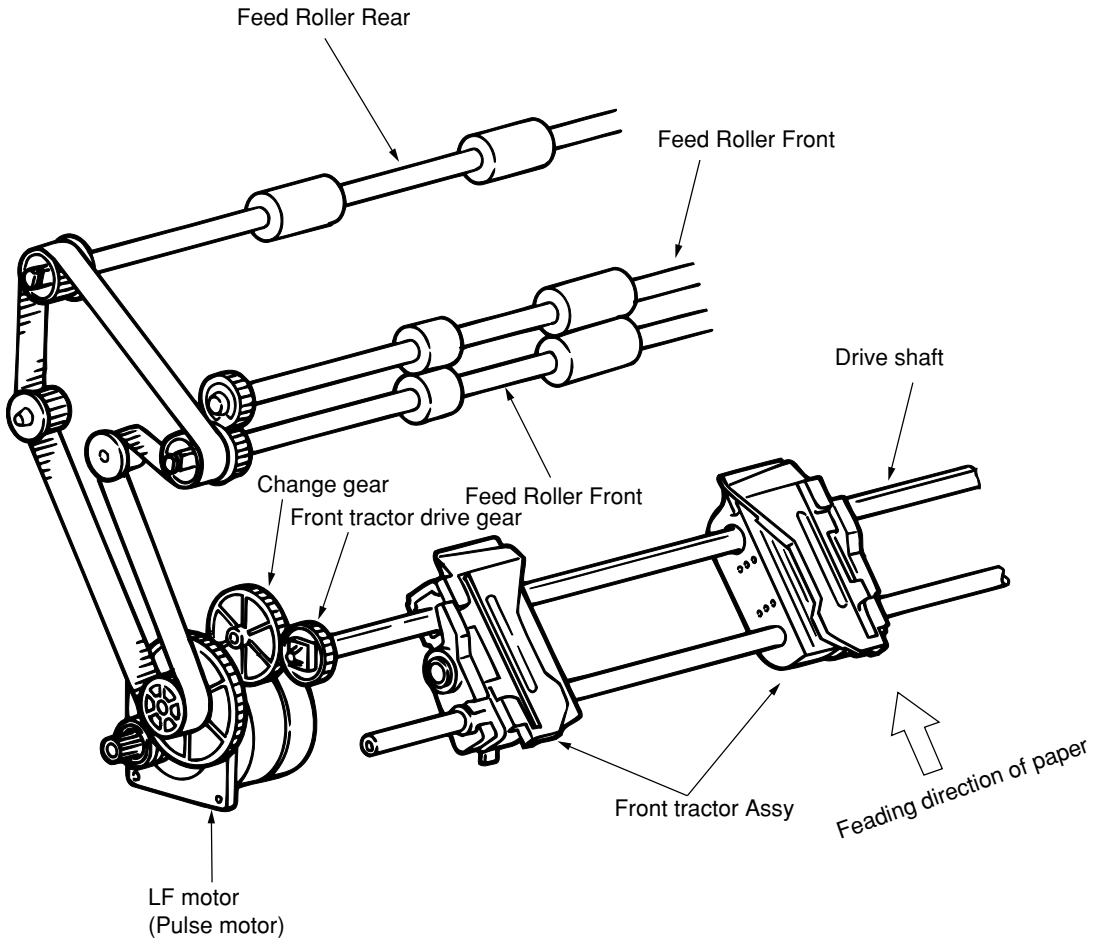


Figure 2.27

(2) Rear tractor

The rotation of the LF motor rotates 2 drive shafts through the LF gear, change gear and rear tractor drive gear A/B, driving the pin wheel and pin belt of the tractor Assy. This feeds a continuous paper set on the pin belt. Simultaneously, this drives the feed roller F/R through the mini-pitch belt following LF gear to carry the paper in synchronization with the tractor.

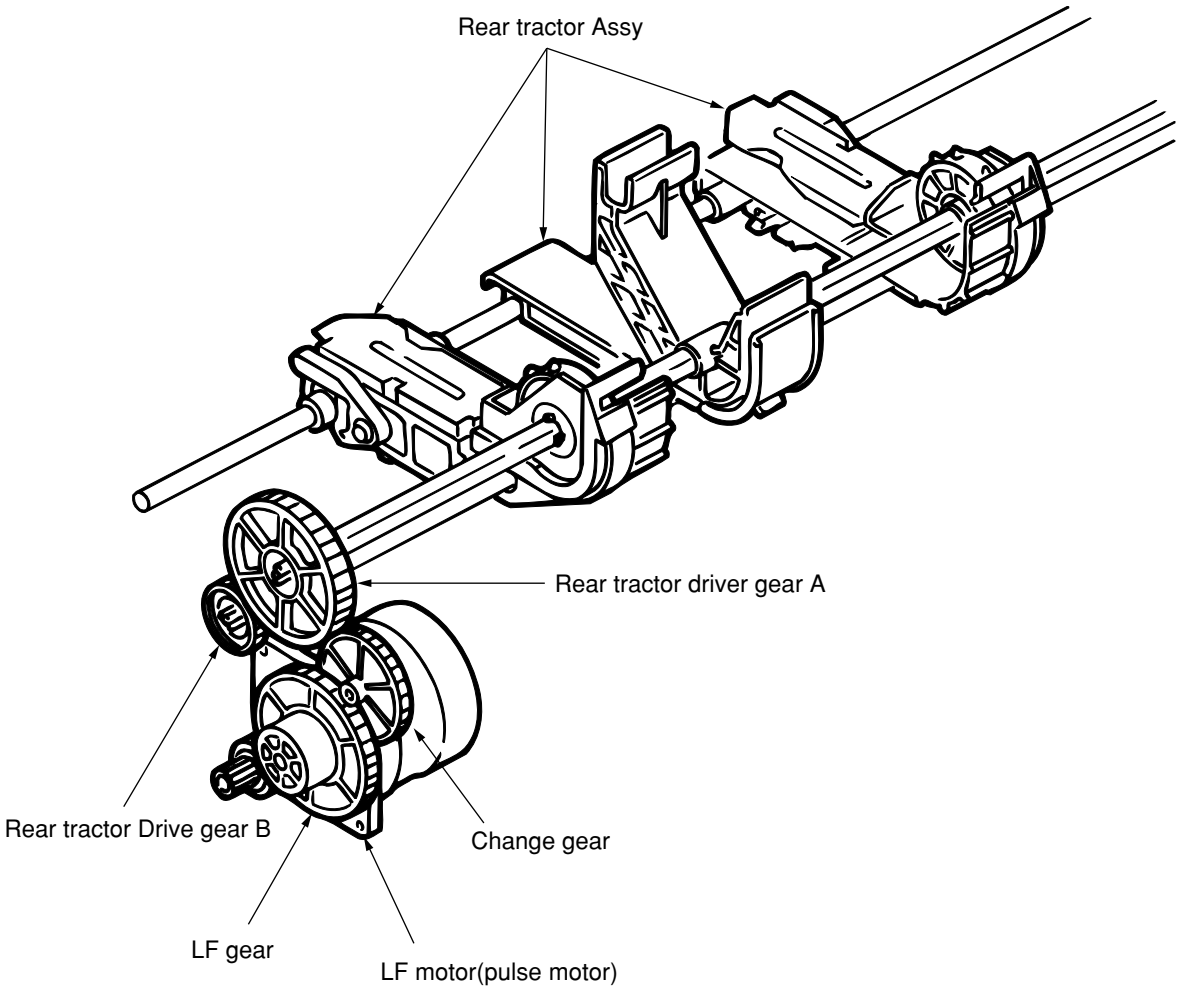


Figure 2.28

(3) Path changing motion

The front tractor and rear tractor are switched by exclusive Path change motor (pulse motor). Operating keys on the operating panel and receiving a command rotates the Path change motor, moving the change lever back and forth through gears so that the change gear moves transversely. If the change gear is shifted to right, the rotational force is transmitted to the front tractor gear, driving the front tractor. If the change gear is shifted to left, the rotational force is transmitted to the rear tractor gear A, driving the rear tractor.

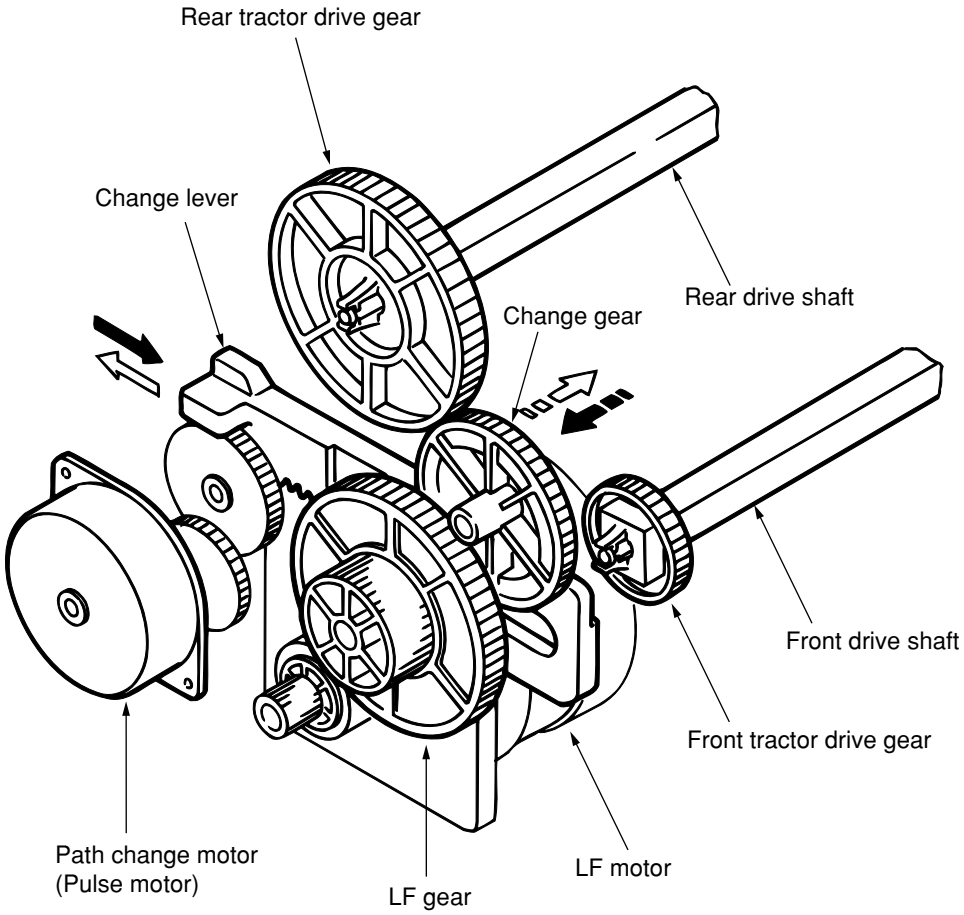
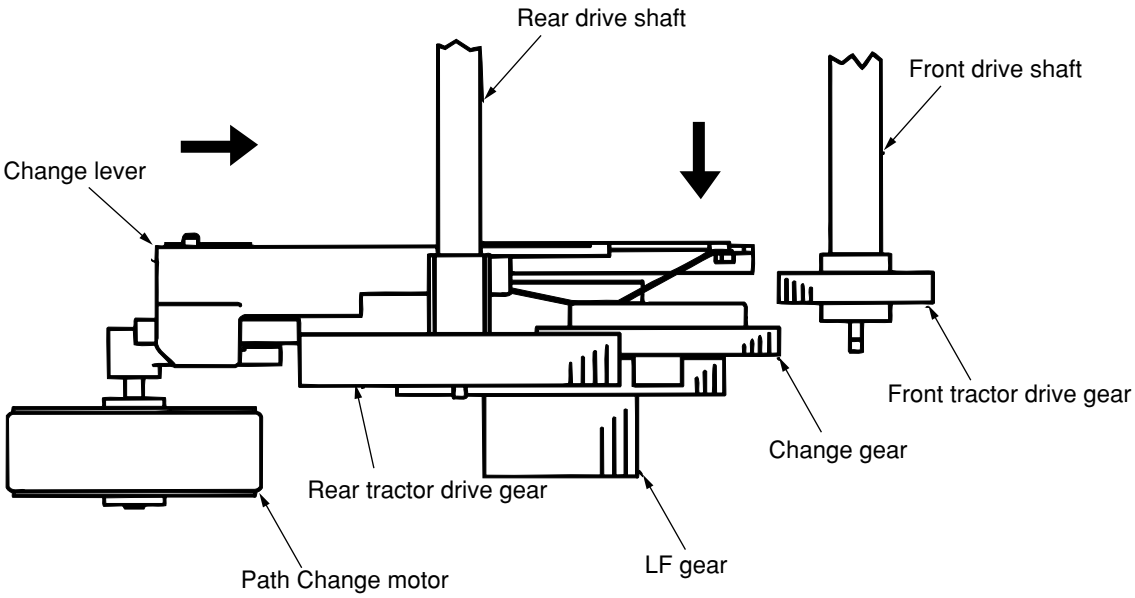


Figure 2.29

• Rear tractor drive



• Front tractor drive

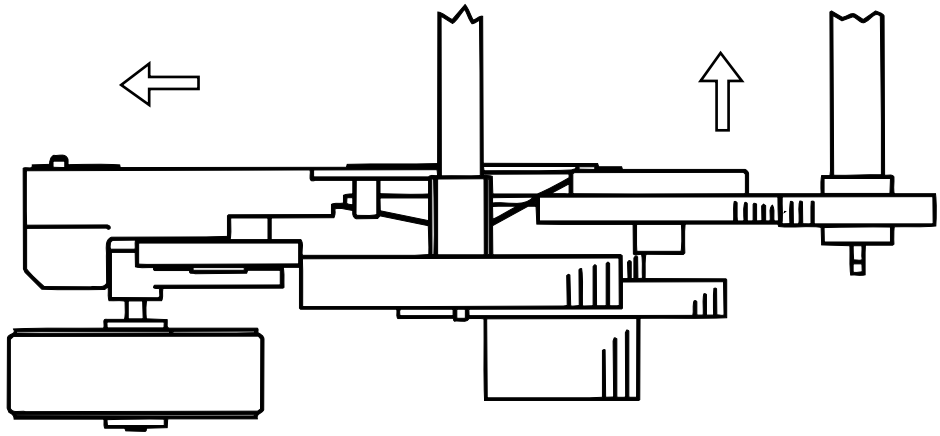


Figure 2.30

2.2.6 Bail Feed Mechanism

This mechanism automatically opens the bail for pulling a paper into, and closes it after the paper passes through the bail.
This function is operated by exclusive bail motor (pulse motor). The bail motor rotates depending on the position of a paper, moving the bail lift lever (L) back and forth through gears.
The moving force of the bail lift lever (L) is also transmitted to the bail lift lever (R) through the support shaft, so the right lever moves longitudinally in synchronization with the left lever. On the bail lever, a cam plate is formed and interlocked to a pin of the bail Assy so that the bail Assy is lifted and lowered by the longitudinal motion of the bail lever.

(1) Bail close position
This position is for the condition where a paper is being printed and carried with both bail Assy and feed roller front upper closed.

(2) Bail open position
This position is for the condition where a paper is being pulled into the bail unit with the bail Assy in open position and the feed roller front upper closed.

(3) Bail half open position
This position is for the condition where a paper is parked or jammed with both bail Assy and feed roller front upper half-opened (to make removal of jammed paper easy).

The rotational force transmitted to the feed roller through mini-pitch belt following the LF gear is, furthermore, transmitted to the bail roller, allowing both-side drive of paper at the bail unit.

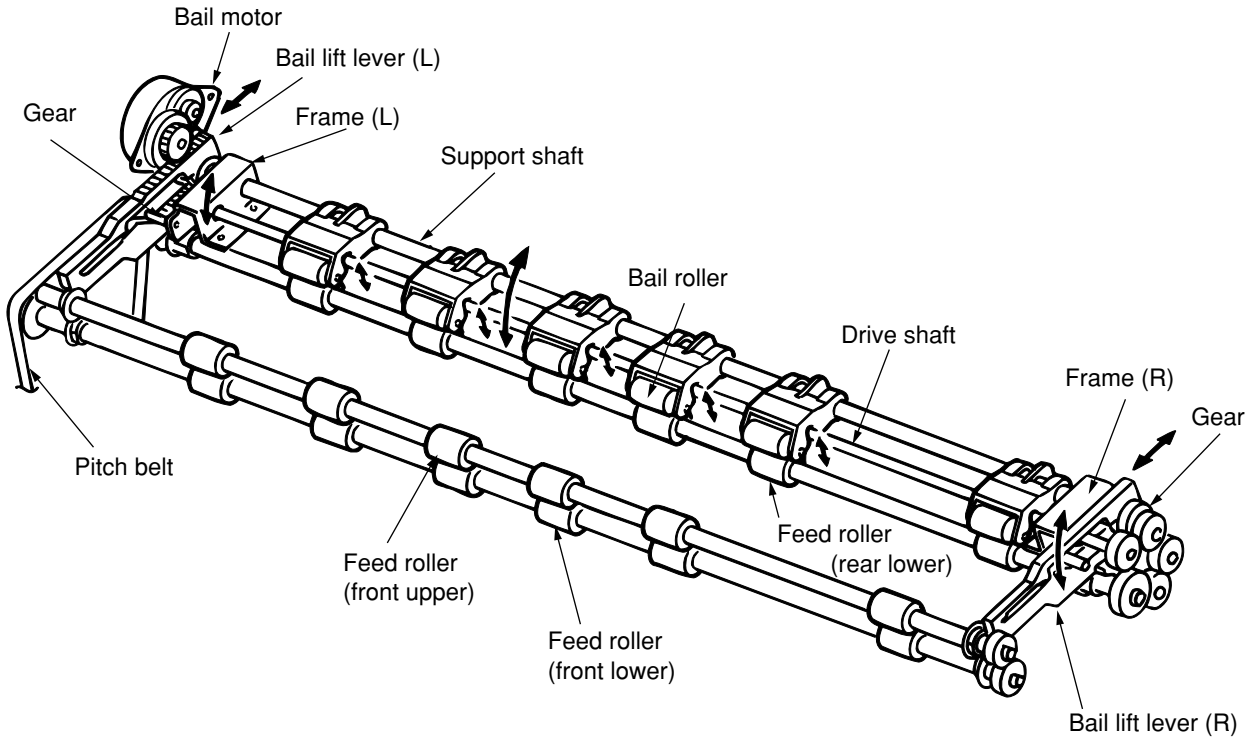
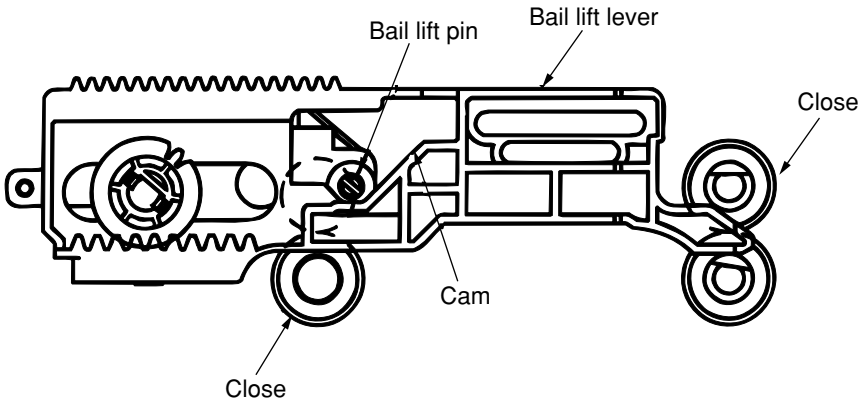
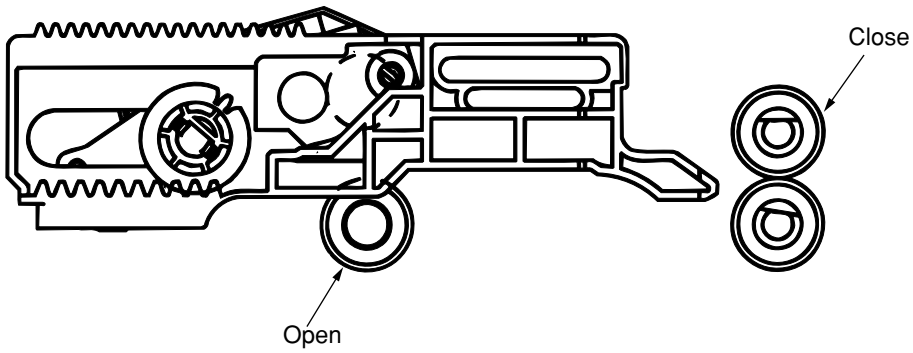


Figure 2.31

(i) Close position



(ii) Open position



(iii) Half open position

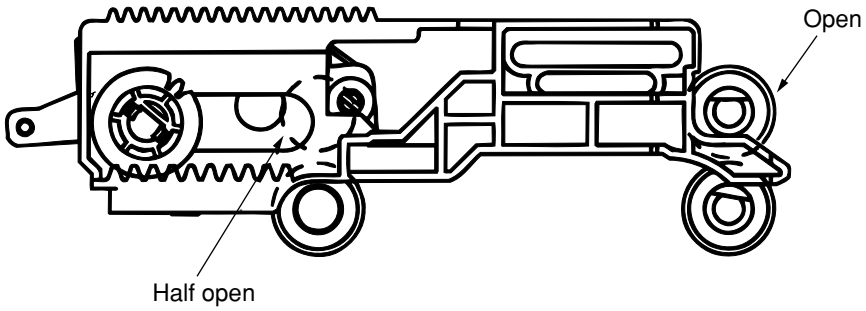


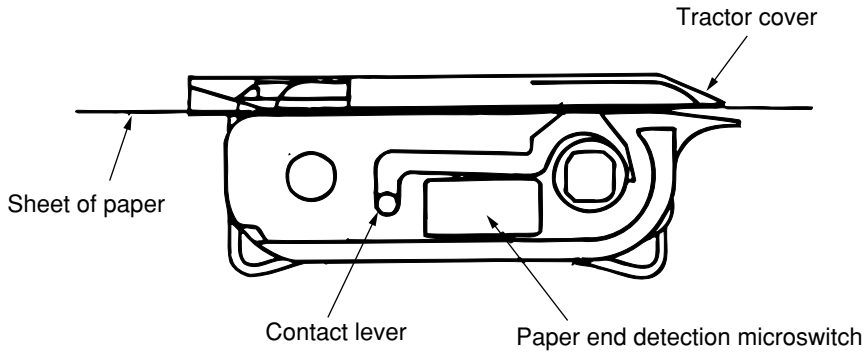
Figure 2.32

2.2.7 Paper End Detection Mechanism

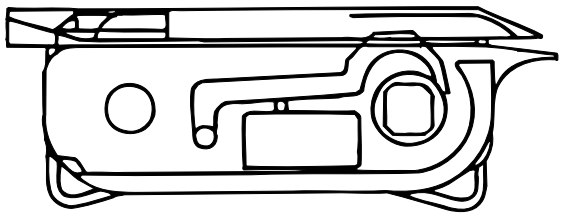
(1) Front/ Rear form end detection mechanism (when the form with sprocket holes is used)

The form prevents the paper end lever tip end from coming into the hole on the sheet feeder cover rib and the microswitch is set to the ON state. When the form runs out, the paper end lever comes into the hole on the sheet feeder cover rib and the bottom of the paper end lever leaves the microswitch to turn it off for form end detection. Both front and rear tractor detects the paper end at 12.7mm.

(2) Front tractor



Tractor with a paper



Tractor without paper

Figure 2.33 Paper end detection mechnism (front tractor)

(3) Rear tractor

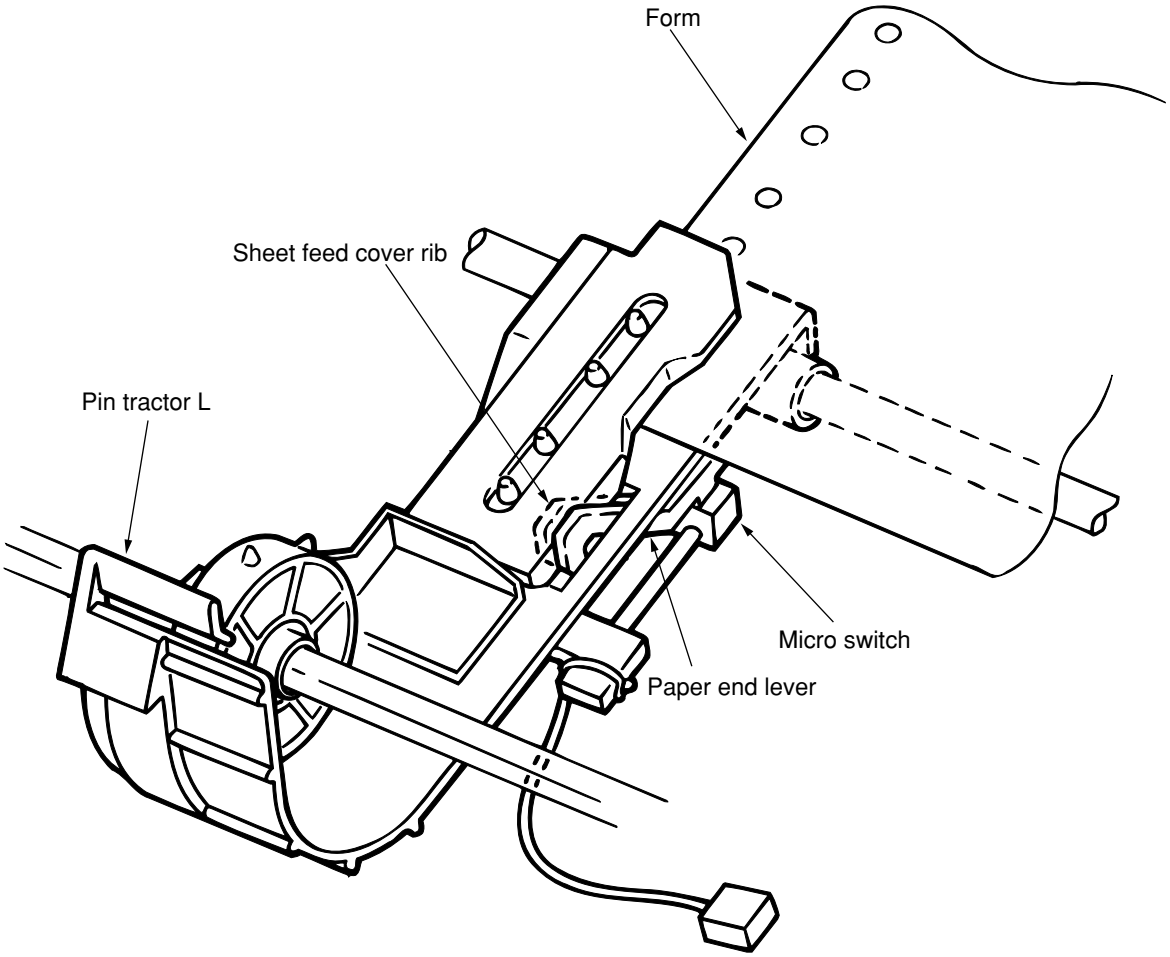


Figure 2.34 Rear form end detection mechanism

3. PARTS REPLACEMENT

The section explains the procedures for replacement of parts, assemblies, and units in the field. Only the removal procedures are explained here. Reverse the procedure for the installation.

3.1 Precautions for Parts Replacement

(1) Before starting parts replacement, remove the AC cable and I/F cable.

(a) Remove the AC cable and the I/F cable in the following procedure:

i) Turn off ("o") the power switch of the printer
ii) Disconnect the AC inlet plug of the AC cable from the AC receptacle.
iii) Disconnect the AC cable and I/F cable from the printer.

⚠**Warning**	Risk of electric shock	

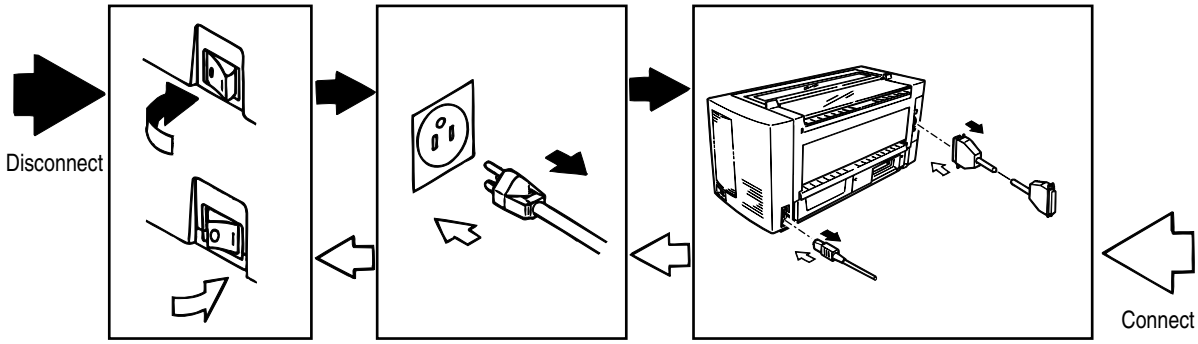
There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

(b) Reconnect the printer in the following procedure.

i) Connect the AC cable and I/F cable to the printer.
ii) Connect the AC inlet plug to the AC receptacle.
iii) Turn on ("I") the power switch of the printer.



(2) Do not try disassembly as long as the printer is operating normally.

(3) Do not remove unnecessary parts: try to keep disassembly to a minimum.

(4) Use specified service tools.

(5) When disassembling, follow the determined sequence. Otherwise, parts may be damaged.

(6) Since screws, collars and other small parts are likely to be lost, they should temporarily be attached to the orginal positions.

(7) When handling ICs such as microprocessors, ROM and RAM, and circuit boards, do not wear gloves that are likely to generate static electricity.

(8) Do not place printed circuit boards directly on the equipment or floor.

(9) If adjustment is specified in the middle of installation, follow the instructions.

(10) Disassembly prohibited parts

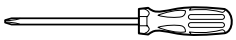
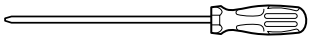
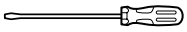
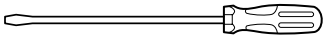
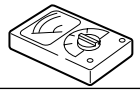
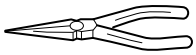
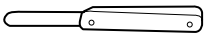
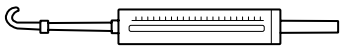
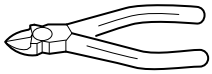
The following units and parts should not be disassembled because they cannot reassembled if they are broken apart.)

Unit	Disassembly prohibited parts	Details
Print head	Print head	Print head unit
Printer Unit	Space motor Ribbon pulse motor AG motor Path change motor Bail motor	Motor unit
	Eccenttric collar (L)/ (R) (within the bearing on the adjusting cam)	Eccentric collar fixing screw (white painted part)
	Gap sensor (AG sensor frame Assy)	Gap sensor fixing screw (white painted part)

[Service Tools]

Table 3-1 shows the tools required for field replacement of printed circuit boards and units.

Table 3-1 Service Tools

No.	Service Tools		Q' ty	Place of use	Remarks
1		No. 1-100 Philips screwdriver	1	2~2.5 mm screws	
2		No. 2-250 Philips screwdriver, Magnetized	1	3~5 mm screws	
3		No. 3-100 screwdriver	1		
4		No. 5-250 screwdriver	1		
5		Digital multimeter	1		
6		Pliers	1		
7		Tweezers	1		
8		Feeler gauge 150MZ	1		
9		1.1 lbs (500g) bar pressure gauge	1		
10		No.5 Nippers	1		

3.2 Parts Layout

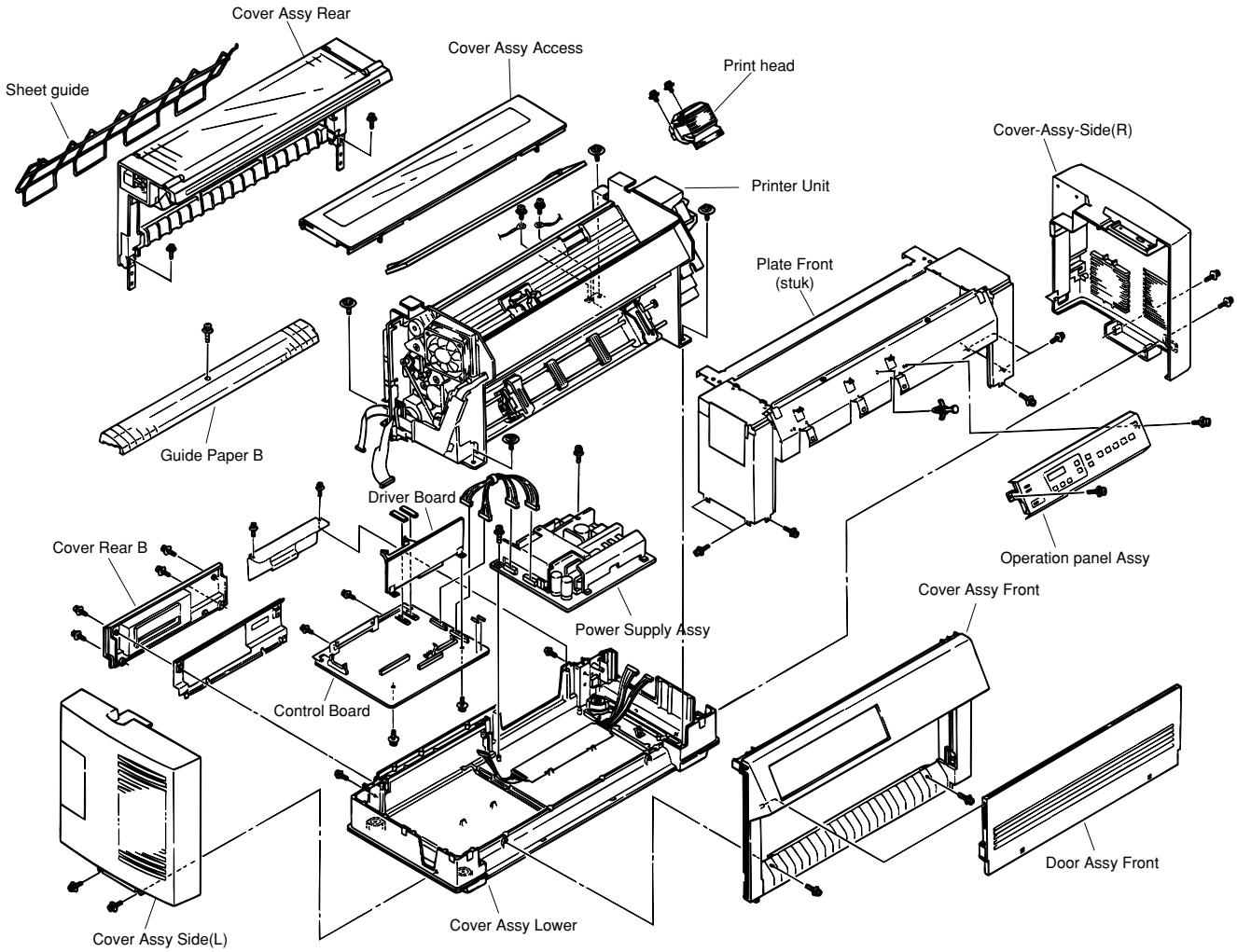


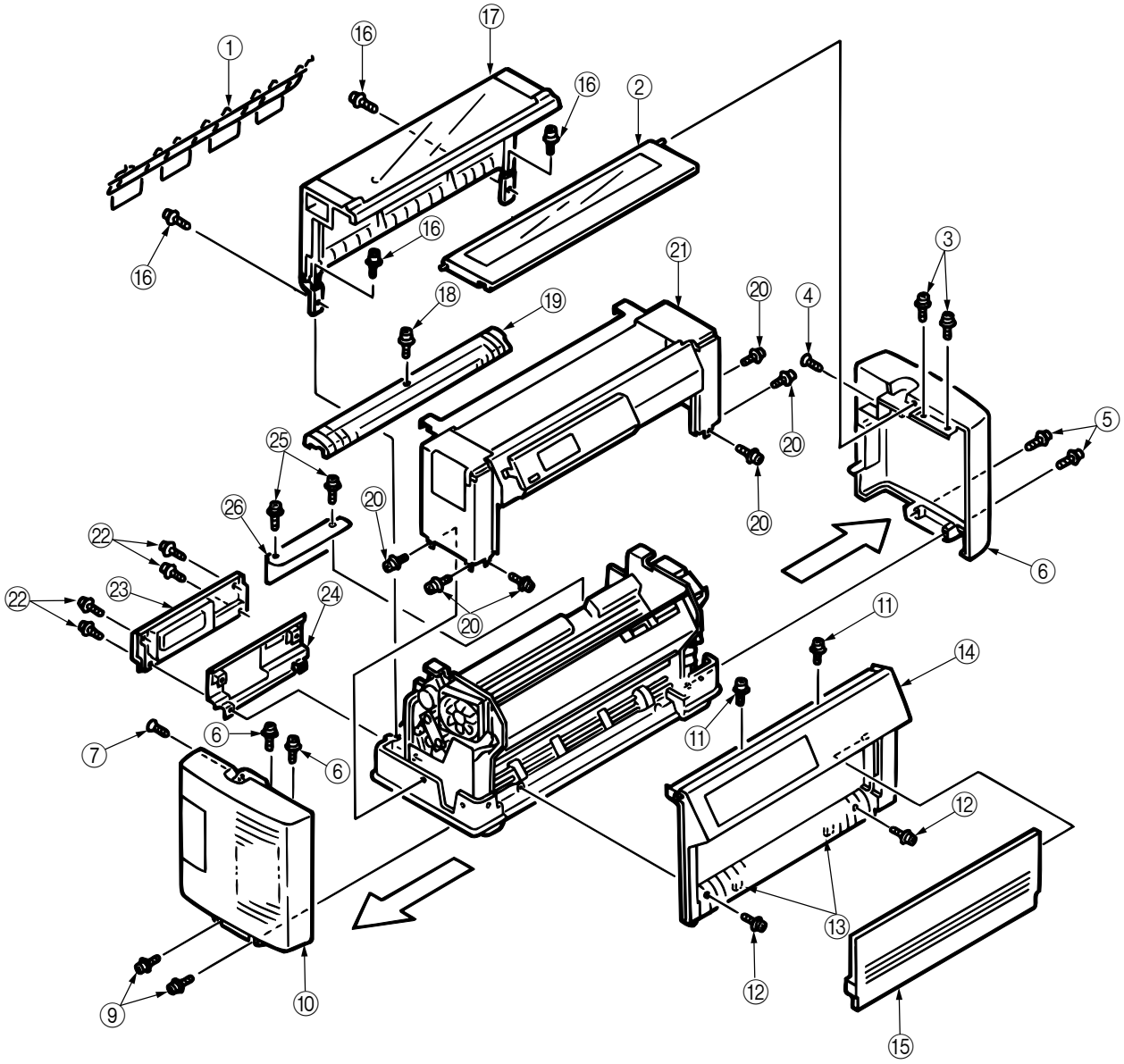
Figure 3-1

3.3 How to Change Parts

This section explains how to change parts and assemblies appearing in the disassembly diagram below.

3.3.1 Cover-Assy-Access / Cover-Assy-Side (R) / Cover-Assy-Side (L) /Cover-Assy-Front / Frame-Assy-Rear / Plate-Front (stuck)

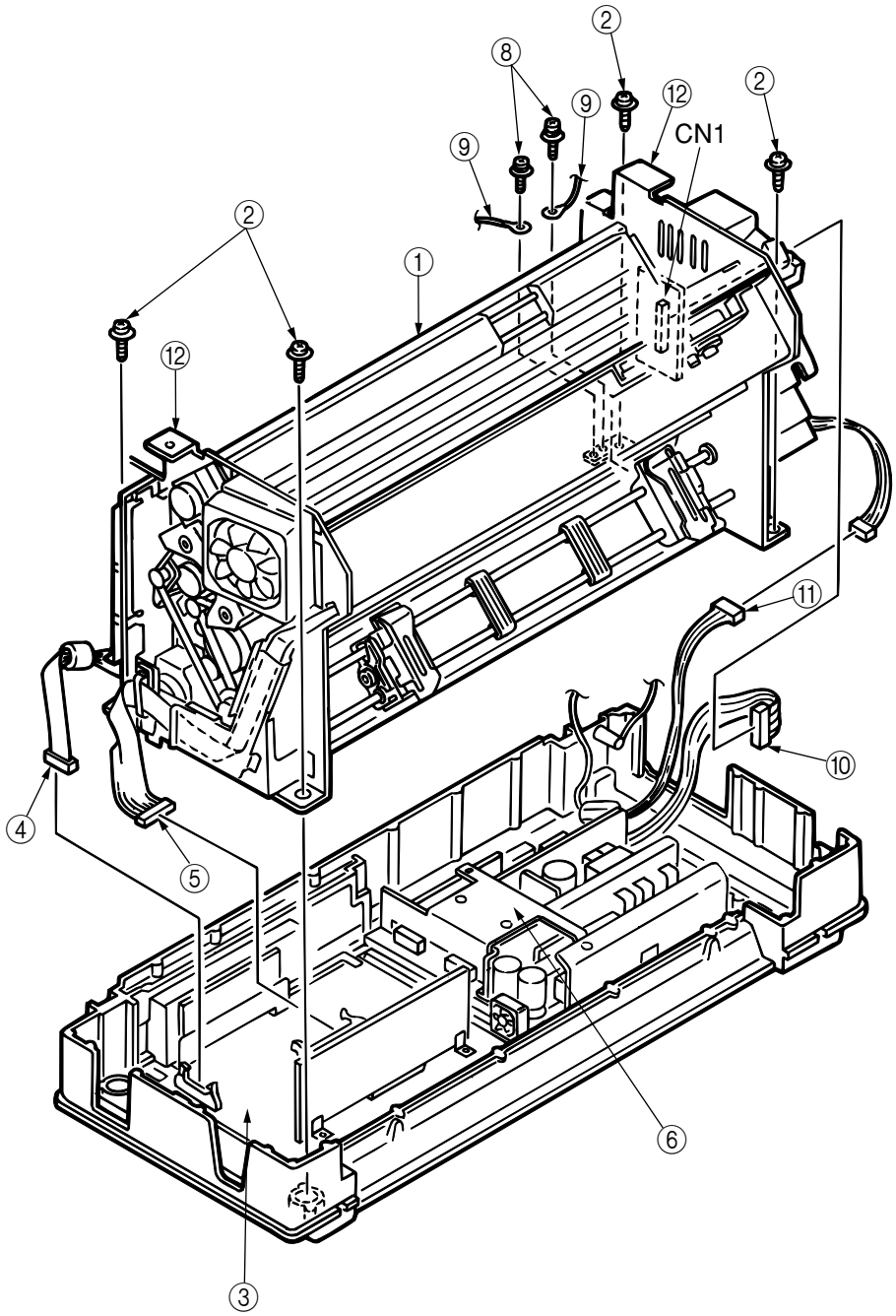
(1) Remove Guide Sheet ① and Cover Assy Access ②.
(2) Unscrew 2 screws ③ and the screw ④ and the screw ⑤, then remove Cover Assy Side (R) ⑥, sliding it to the arrow direction.
(3) Unscrew 2 screws ⑦ and the screw ⑧ and the screw ⑨, then remove Cover Assy Side (L) ⑩, sliding it to the arrow direction.
(4) Unscrew 4 screws ⑪ and the screw ⑫.
(5) Release Hooks ⑬ then remove Cover Assy Front ⑭ and Door Assy Front ⑮.
(6) Unscrew 4 screws ⑯ then lift and remove Frame Assy Rear ⑰.
(7) Unscrew the screw ⑱ then remove Guide Paper (B) ⑲.
(8) Unscrew 6 screws ⑳ then lift and remove Plate Front (stuck) ㉑.
(9) Unscrew 4 screws ㉒ then remove Cover Rear B ㉓ and Plate Earth (Cover Rear) ㉔ together.
(10) Unscrew 2 screws ㉕ then remove Cover Blank (lower) ㉖.
(11) For installation, reverse the removal procedure.



3.3.2 Printer Unit

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew 4 screws ② which fix Printer Unit ①.
(3) Unplug I/F Connecting Cable ④ and Head Cable ⑤ from Control Board ③.
(4) Unplug the connector to Power Supply Assy ⑥ and unscrew 2 screws ⑧, then remove FG Wires ⑨.
(5) Unplug Junction Board Cord ⑩ from Junction Board (CN1).
(6) Unplug SP Slit Sensor Cord ⑪.
(7) With the handle ⑫ held, lift and remove Printer Unit ①.

(Note on Installation)
1. When lowering Printer Unit, prevent connection cords/cables from being caught under the unit. (Lifting and lowering Printer Unit require 2 or more maintenance personnel.)



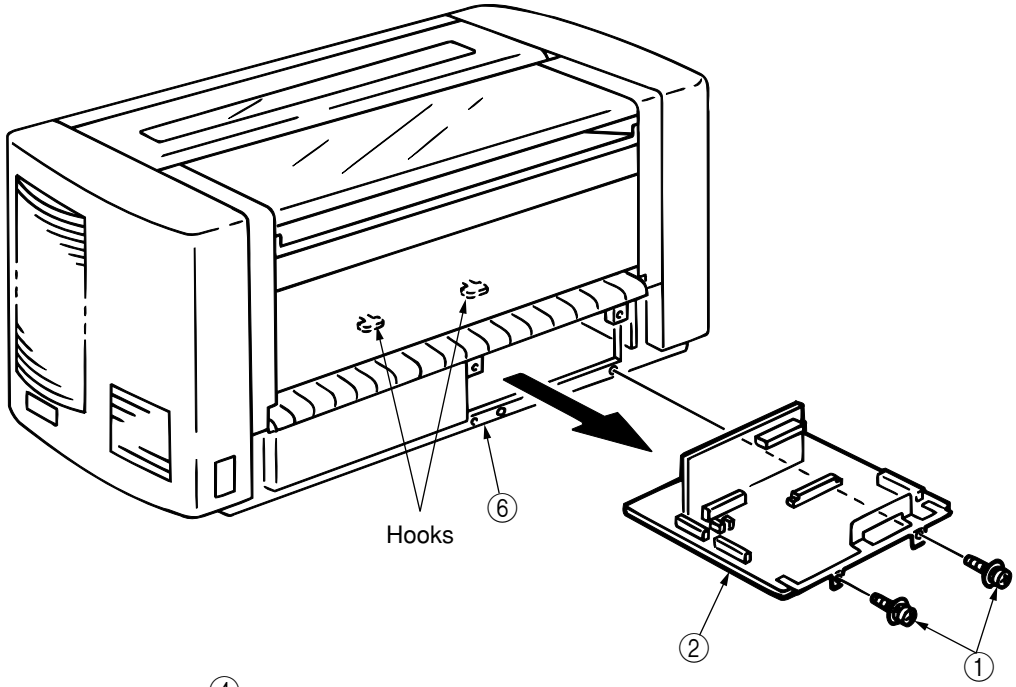
3.3.3 Control Block [Control Board, Driver Board]

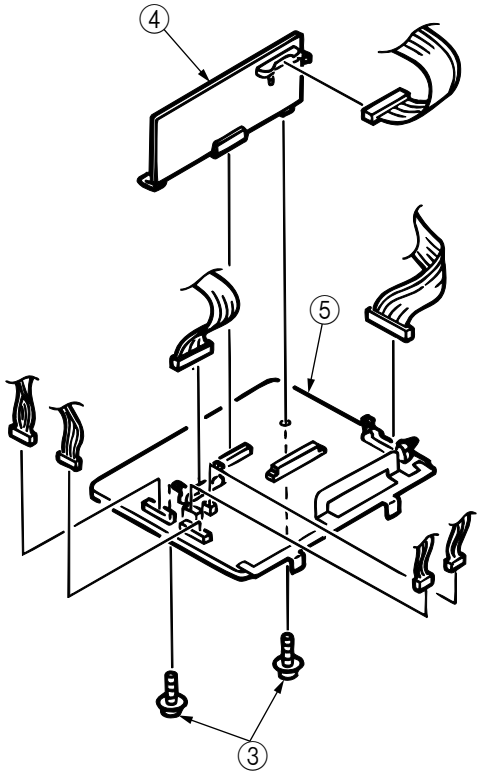
(1) Remove Cover Rear (B). (See 3.3.1)
(2) Unscrew 2 screws ① and unplug all the connecting cords to Control Block ②.
(3) Remove Control Block ②, sliding it into the arrow direction.

[Control Board and Driver Board]
Unscrew 2 screws ③ then pull Driver Board ④ upward and release it from the connecting position to Control Board ⑤.

(4) For installation, reverse the removal procedure.

(Note on Installation)
1. Prevent the connecting cords form being caught under Control Black ②.
2. Make sure Control Block ② is fixed with 2 hooks on Lower Cover ⑥, when mounting the Unit.





3.3.4 Power Supply Assy

⚠Warning	Risk of Electric Shock	

There is a risk of electric shock during replacement of the power supply.

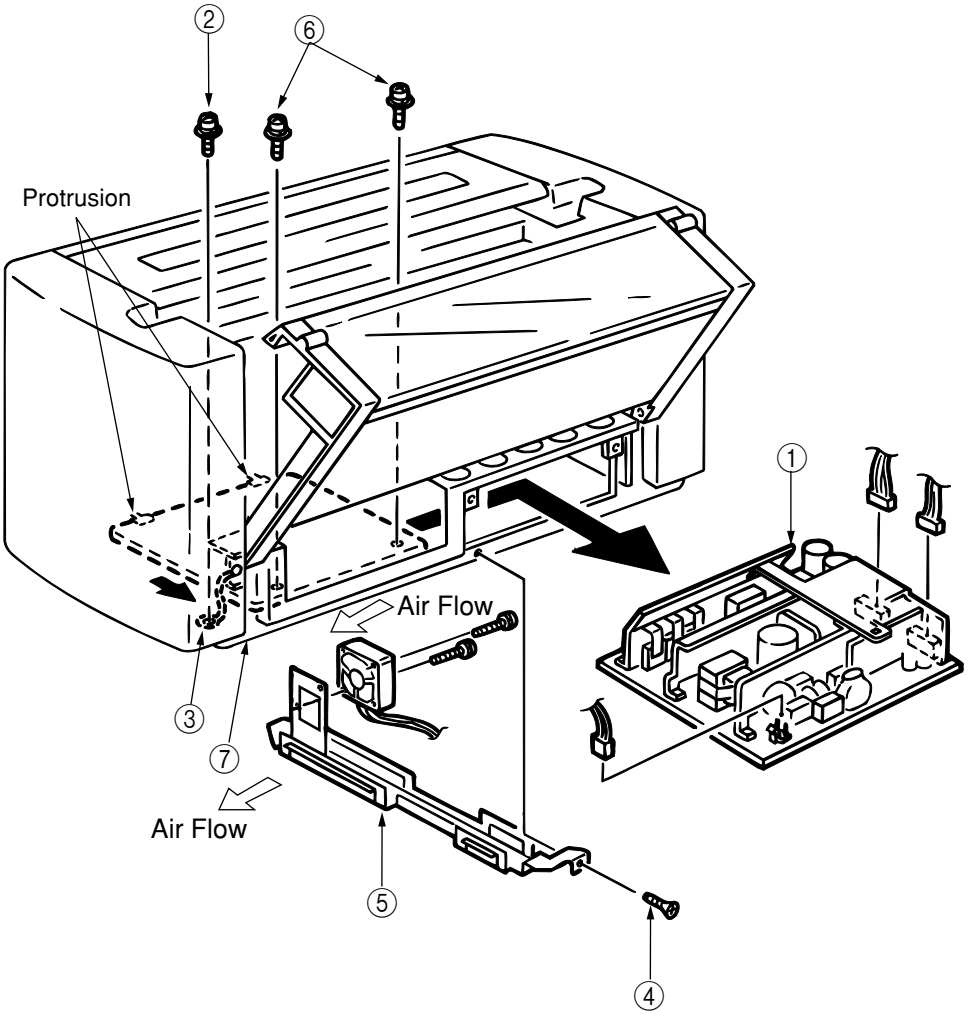
Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cable is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

(1) Remove Guide Paper (B), Cover Blank Lower and Rear Cover (B). (See 3.3.1)
(2) Unplug connectors to Power Supply Unit ①.
(3) Unscrew the screw ② and release Earth Wire ③.
(4) Unscrew the screw ④ and remove Bracket PG ⑤.
(5) Unscrew 2 screws ⑥. Pulling forward the protrusion on Power Supply Unit ① and sliding it in the arrow direction through 2 inserting positions, remove Power Supply Unit.
(6) For installation, reverse the removal procedure.

(Note on Installation)

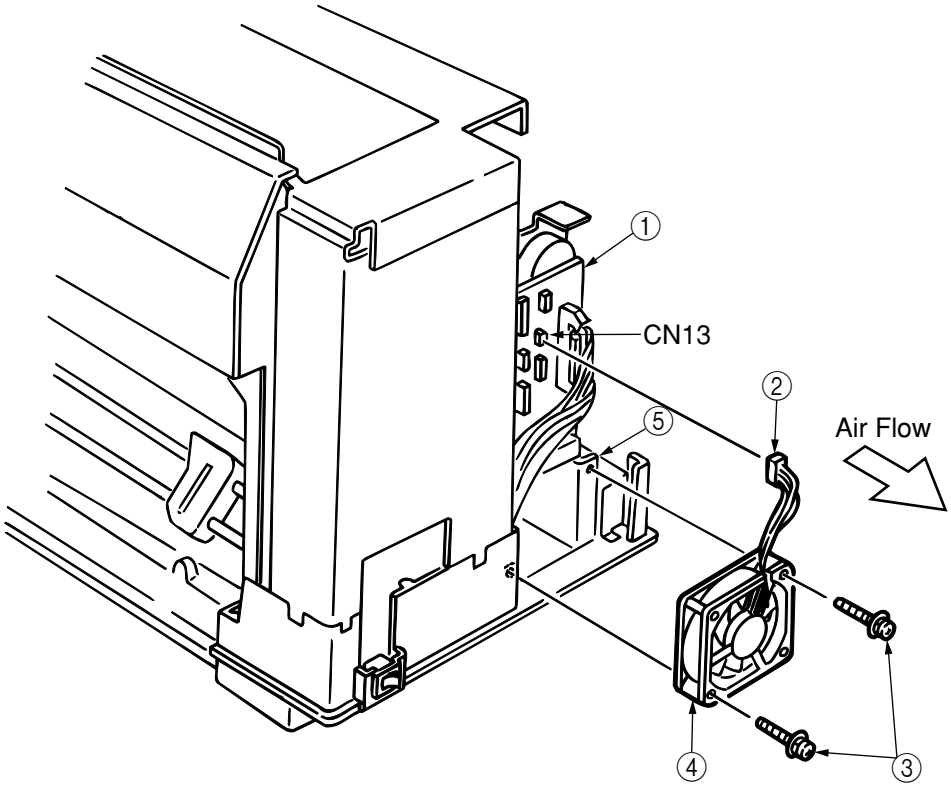
1. Insert the protrusion on Power Supply Unit ① into the inserting positions on Lower Cover ⑦ and mount the Unit.
2. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.5 Power Supply Cooling Fan

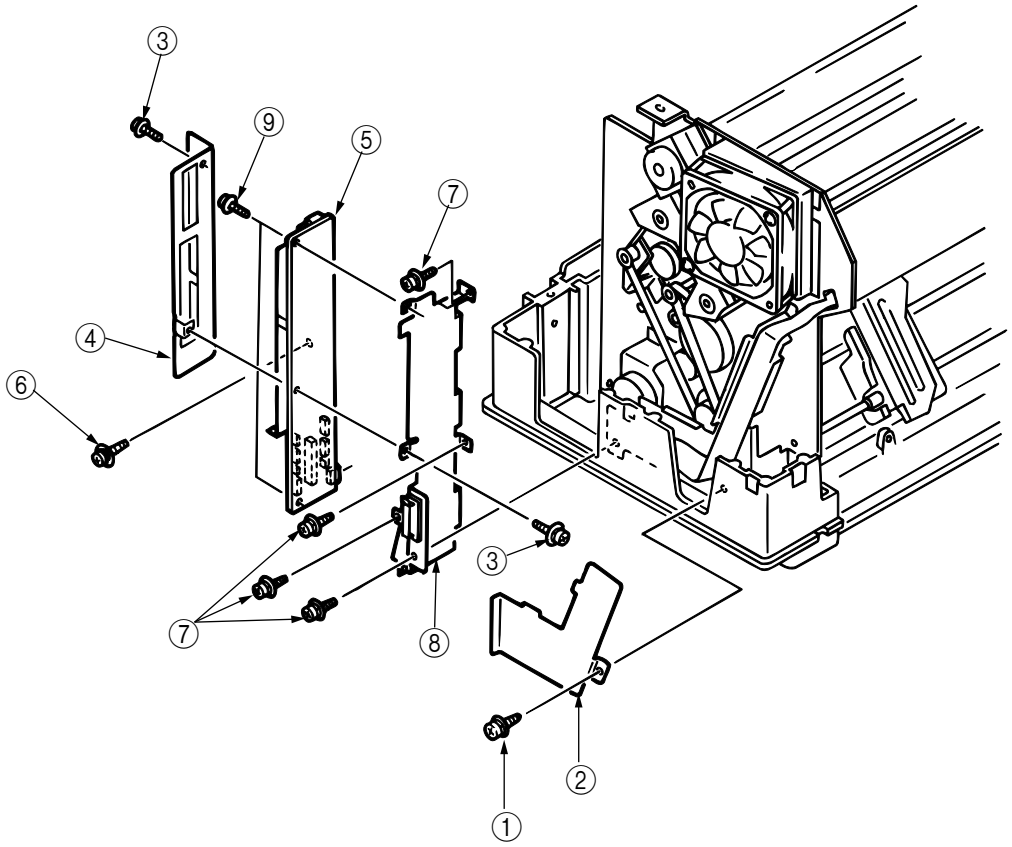
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear. (See 3.3.1)
(2) Unplug the connectors ② to Junction Board (CN13)①.
(3) Unscrew 2 screws ③ and remove Power Supply Cooling Fan ④.
(4) For installation, reverse the removal procedure.

(Note on Installation)
1. Mount the fan to produce wind in the direction as indicated on Power Supply Fan Bracket ⑤.
2. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.6 I/F Board

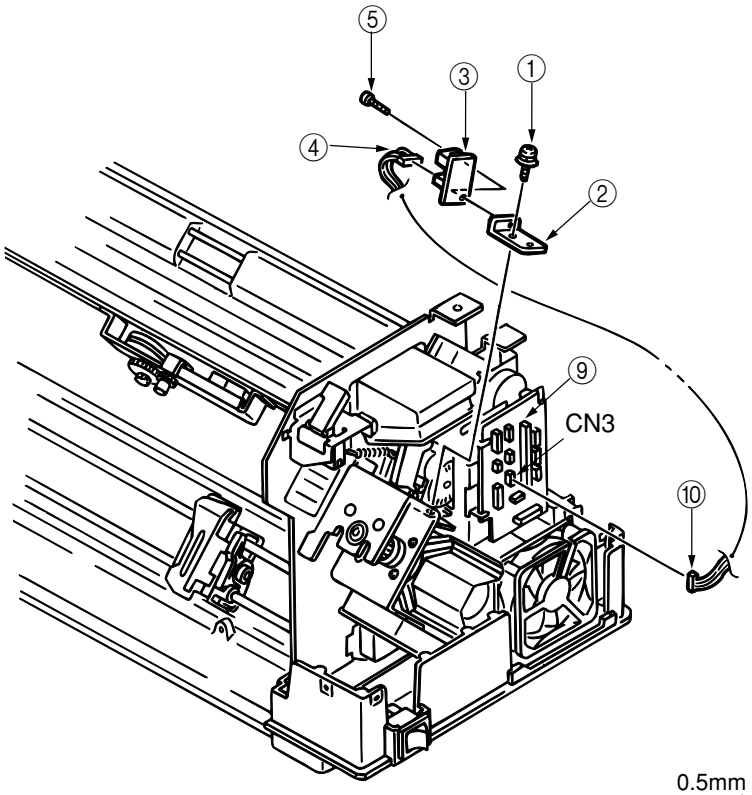
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew the screw ① and remove Cable Holder ②.
(3) Unscrew 2 screws ③ and remove I/F Board Holder Cover ④.
(4) Unplug all the connectors to I/F Board ⑤.
(5) Unscrew the screw ⑥ and 4 screws ⑦, then remove I/F Board ⑤ and I/F Board Holder ⑧ together.
(6) Unscrew 2 screws ⑨ and remove I/F Board ⑤.
(7) For installation, reverse the removal procedure.

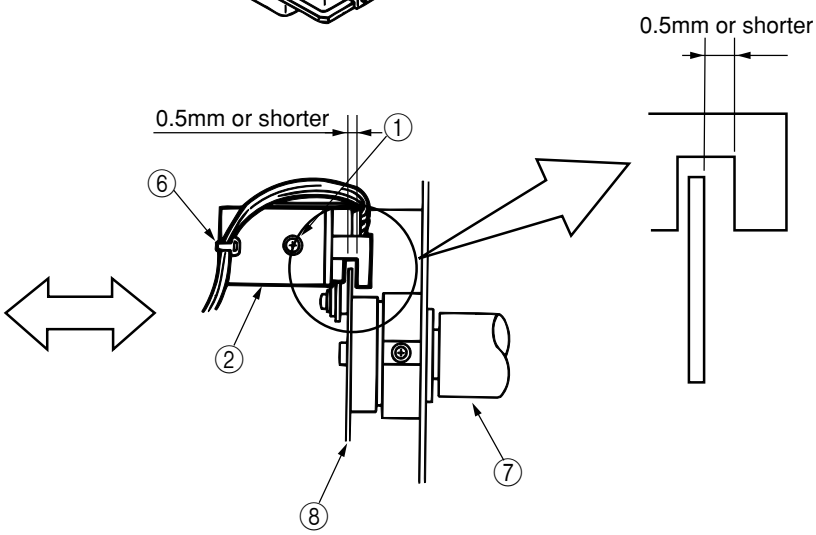


3.3.7 AG Board / Connector Cord

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug the connectors ⑩ to Junction Board (CN3) ⑨.
(3) Unscrew the screw ①.
(4) Remove AG Board Holder A ②, AG Board ③ and AG Slit Sensor Cord ④ together.
(5) Unscrew the screw ⑤ and release the wrapping tie ⑥, then remove AG Board ③ and unplug AG Slit Sensor Cord ④.
(6) For installation, reverse the removal procedure.

(Note on Installation)
1. The distance to Slit Disk should be 0.5 mm or shorter.
2. Screwing down the screw ①, move Sensor Bracket ② into the arrow direction to produce the following conditions:
   Slit Disk ⑧ does not touch Sensor when Main Shaft ⑦ is shifted up to its right play end, and the gap should be 0.5 mm or shorter when Main Shaft ⑦ is shifted up to its left play end. (Check the above conditions for all Slit Disk ⑧ surface.)



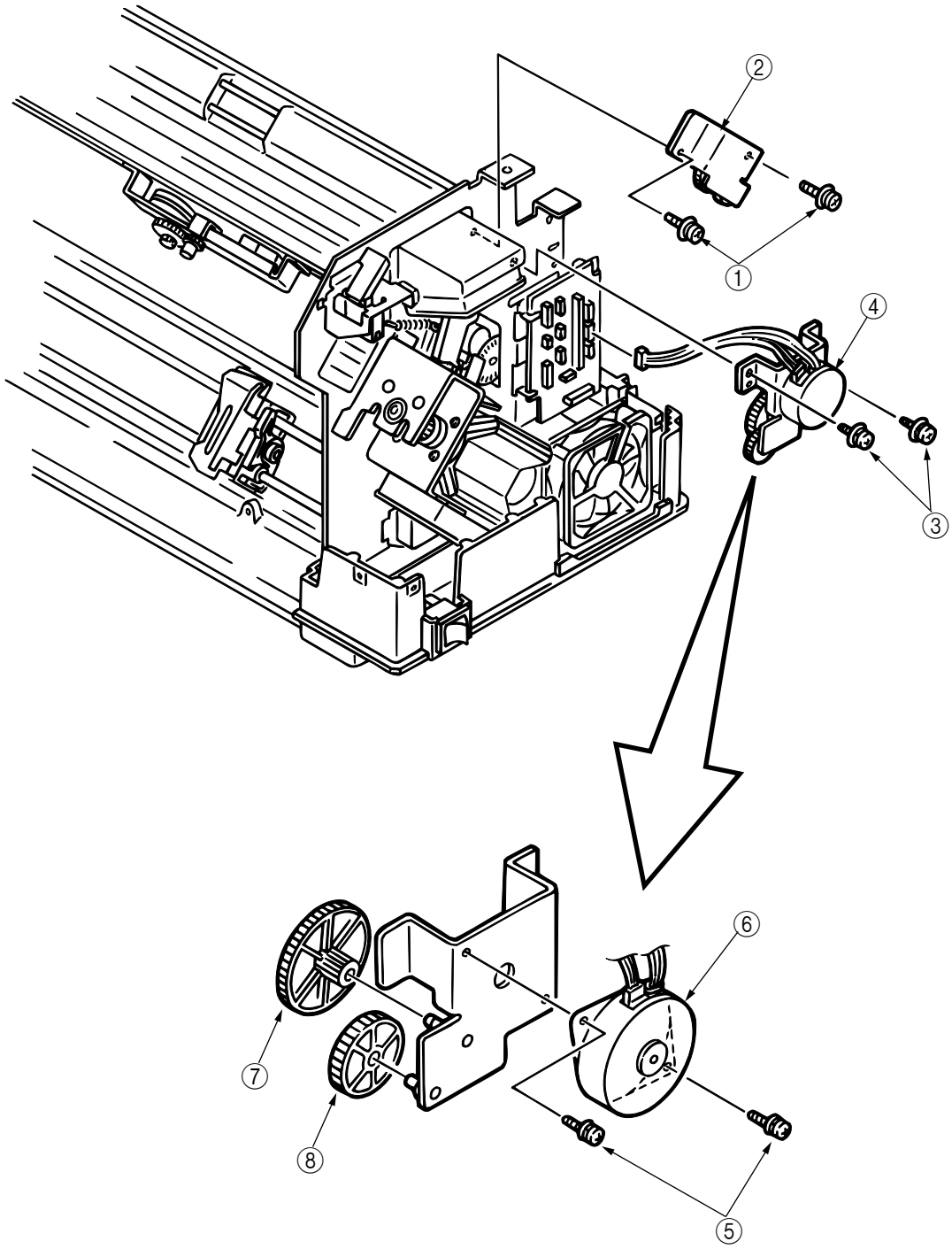


[Note on installation]

3.3.8 AG Motor Assy

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew 2 screws ① and remove Bail Gear Assy ②.
(3) Unscrew 2 screws ③ and remove AG Motor Assy ④.
(4) Unscrew 2 screws ⑤ and remove Motor ⑥.
(5) Remove Idle Gear C ⑦ and Tractor Idle Gear ⑧.
(6) For installation, reverse the removal procedure.

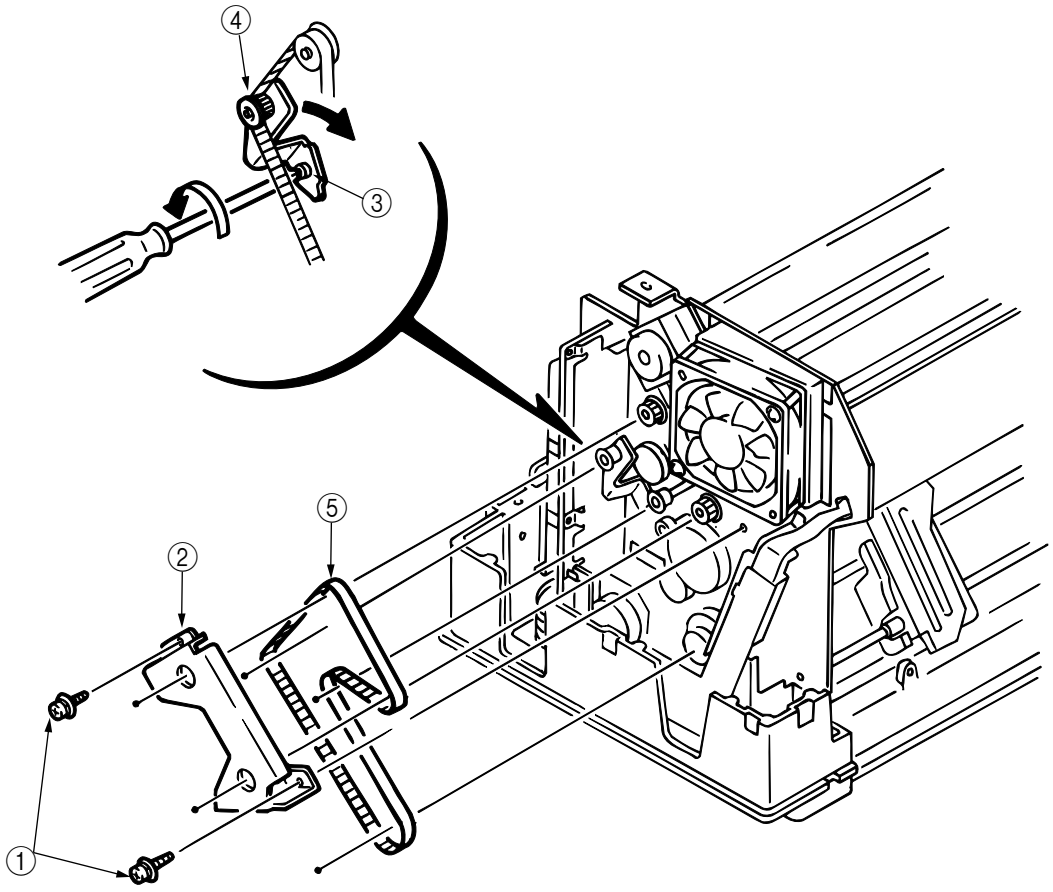
(Note on Installation)
1. Making sure Idle Gear C ⑦ and Tractor Idle Gear ⑧ with AG Motor Assy ② rotate smoothly without play, mount the motor assy.



3.3.9 Mini Pitch Belt

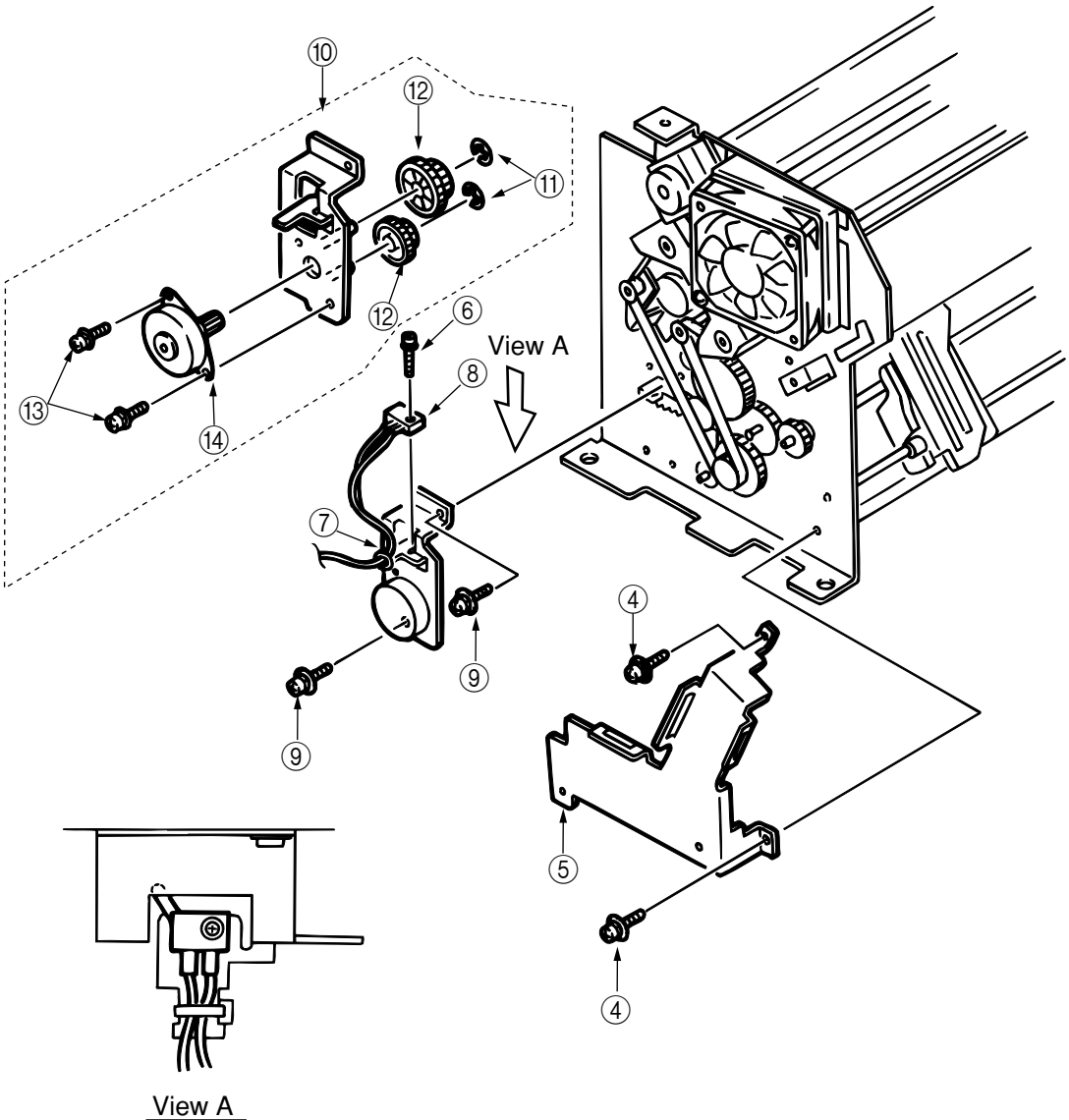
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew 2 screws ① and remove Shaft Support Plate (press fit) ②.
(3) Screw down the screw ③ and turn Idle Pulley Assy ④ into the right direction.
(4) Remove Mini Pitch Belt ⑤.
(5) For installation, reverse the removal procedure.

(Note on Installation)
1. Adjust the belt play after installing Mini Pitch Belt ⑤.



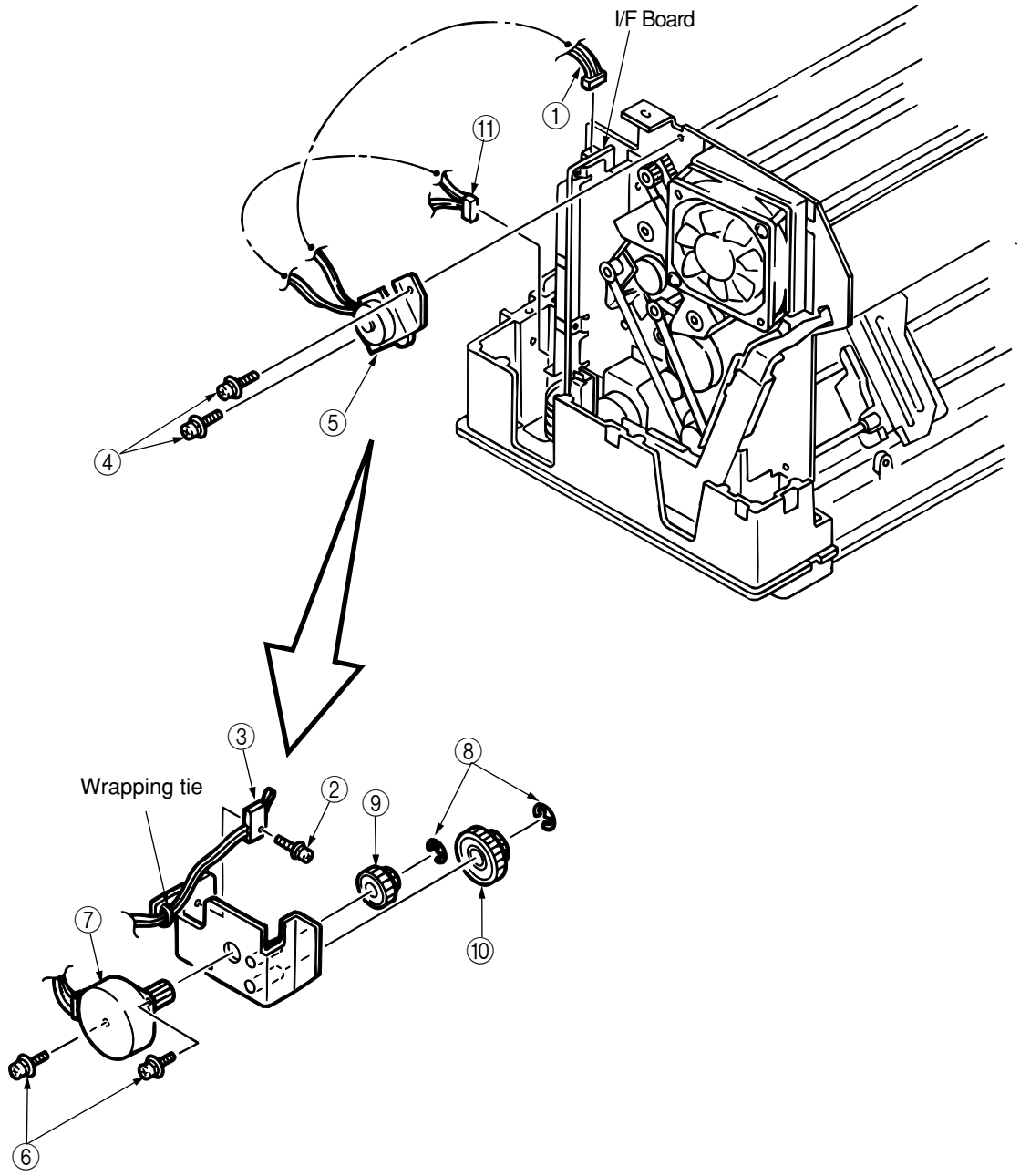
3.3.10 Path Change Motor Assy

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printer Unit. (See 3.3.2)
(3) Remove I/F Board. (See 3.3.6)
(4) Release the cords from Cord Clamp on the cord route.
(5) Unscrew 2 screws ④ and remove Cable Holder ⑤.
(6) Unscrew the screw ⑥ and cut the wrapping tie ⑦.
(7) Remove Micro Switch ⑧.
(8) Unscrew 2 screws ⑨ and remove Path Change Motor Assy ⑩.
(9) Remove E rings ⑪ and the gear ⑫.
(10) Unscrew 2 screws ⑬ and remove Motor ⑭.
(11) For installation, reverse the removal procedure.



3.3.11 Bail Motor Assy

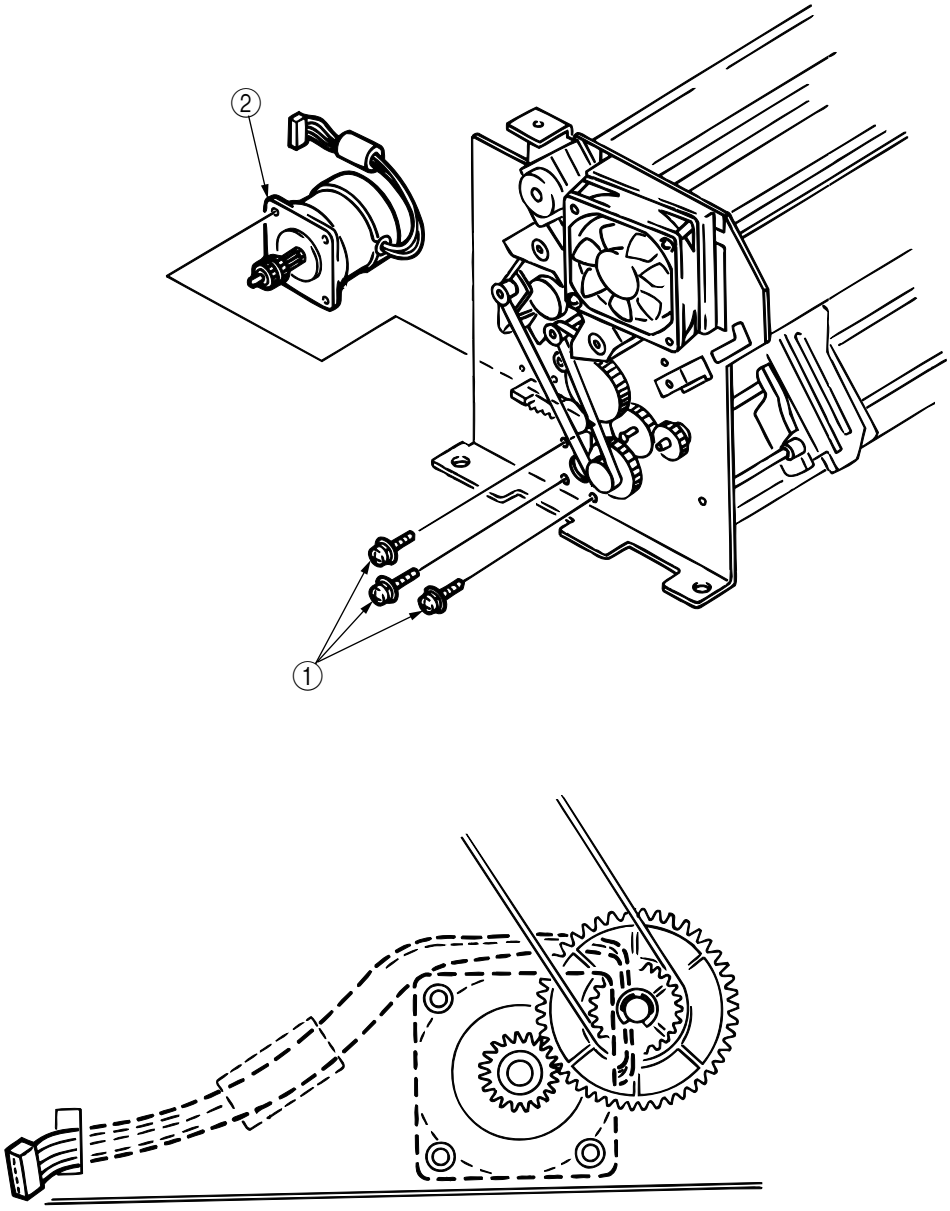
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug the connectors ① from I/F Board (CN2) .
(3) Unplug the connectors ⑪ from I/F Board (CN11) .
(4) Release the cords from the cord clamps on the cord route.
(5) Unscrew the screw ② and cut the wrapping tie.
(6) Remove Micro Switch ③.
(7) Unscrew 2 screws ④ and remove Bail Motor Assy ⑤.
(8) Unscrew 2 screws ⑥ and remove the motor ⑦.
(9) Remove E rings ⑧ and 2 gears ⑨ and ⑩.
(10) For installation, reverse the removal procedure.



3.3.12 LF Motor Assy

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove I/F Board. (See 3.3.6)
(3) Remove Printer Unit. (See3.3.2)
(4) Remove Tractor Change Motor Assy. (See3.3.10)
(5) Unscrew 3 screws ① and remove LF Motor ②.
(6) For installation, reverse the removal procedure.

(Note on Installation)
1. LF Motor Assy ② should be mounted with the cord route as shown below.

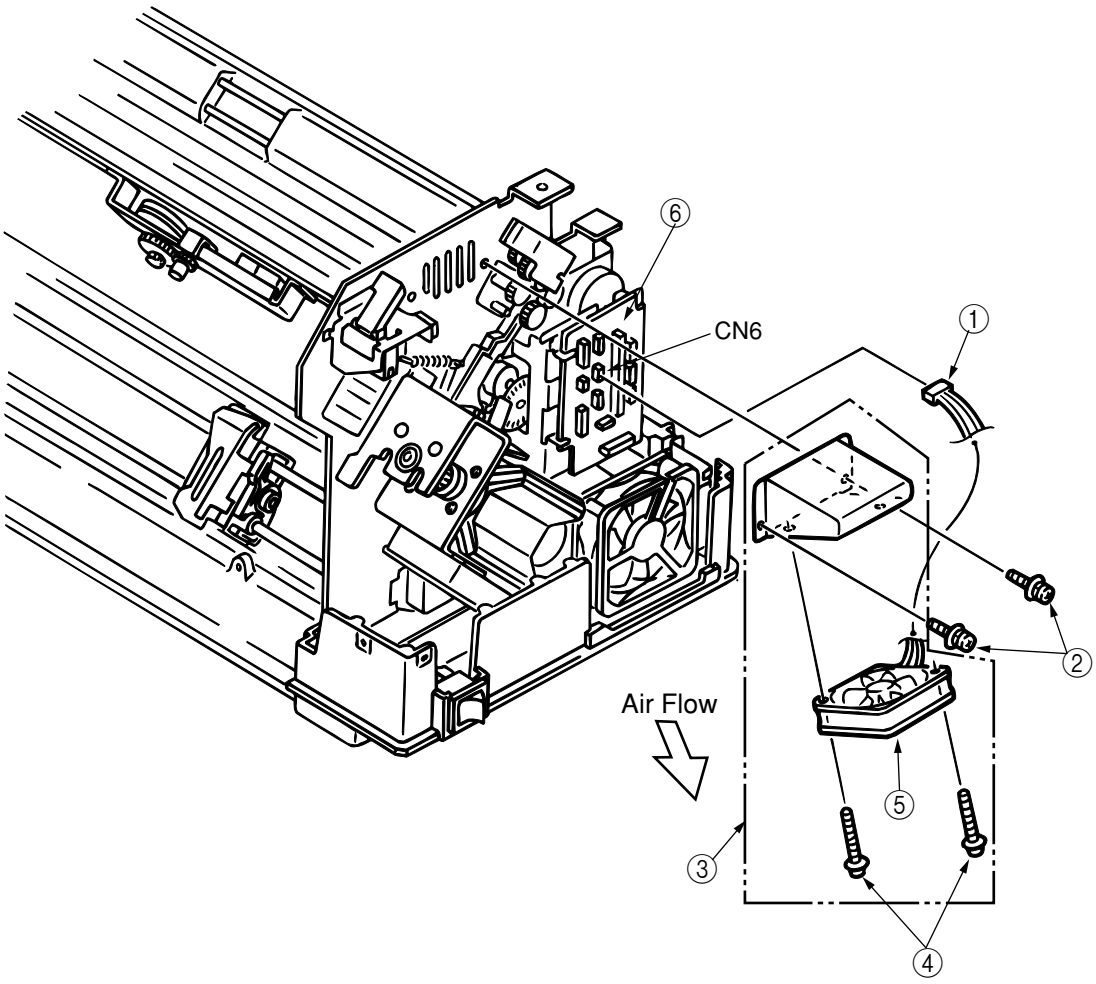


[LF Motor Assy Cord Route Fig.]

3.3.13 Head Cooling Fan 1

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug the connector ① from Junction Board (CN6) ⑥.
(3) Release the cords from the cord clamps on the cord route.
(4) Unscrew 2 screws ② and remove SP Motor Fan Assy ③.
(5) Unscrew 2 screws ④ and remove Head Cooling Fan 1 ⑤.
(6) For installation, reverse the removal procedure.

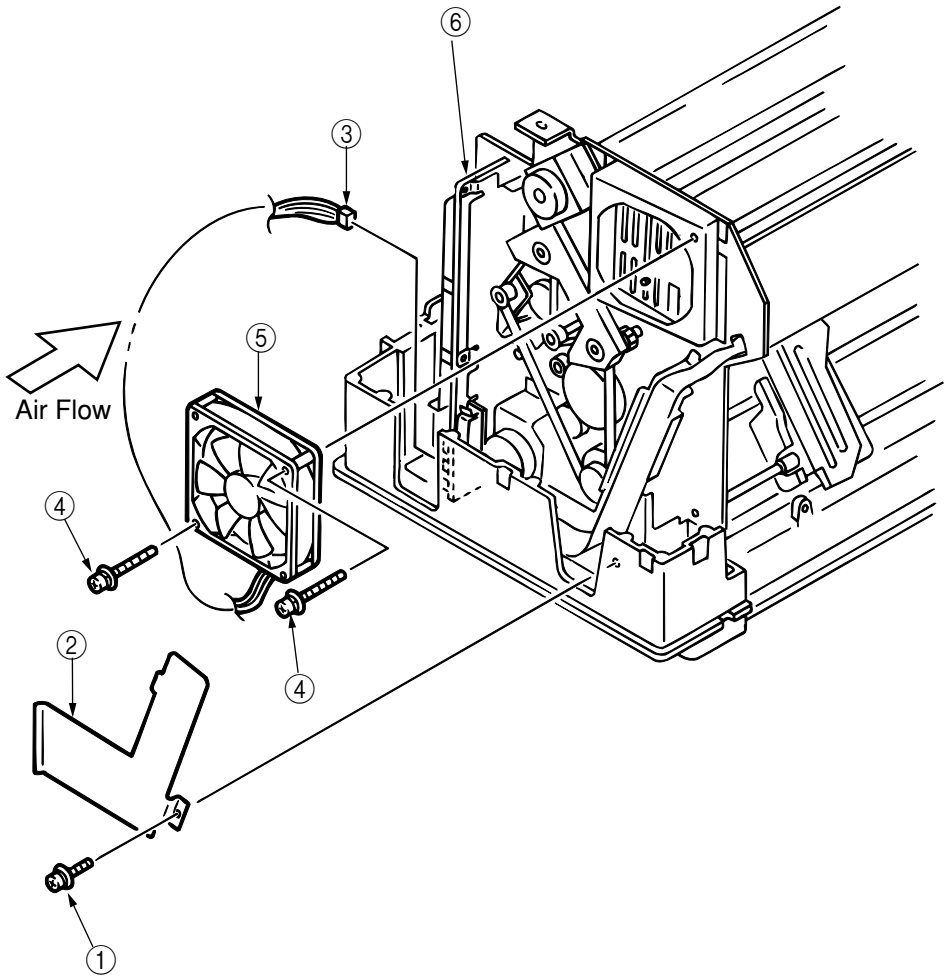
(Note on Installation)
1. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.14 Head Cooling Fan 2

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew the screw ① and remove Cable Holder Cover ②.
(3) Unplug the connector ③ from I/F Board (CN6) ⑥.
(4) Release the cords from the cord clamps on the cord route.
(5) Unscrew 2 screws ④ and remove Head Cooling Fan 2 ⑤.
(6) For installation, reverse the removal procedure.

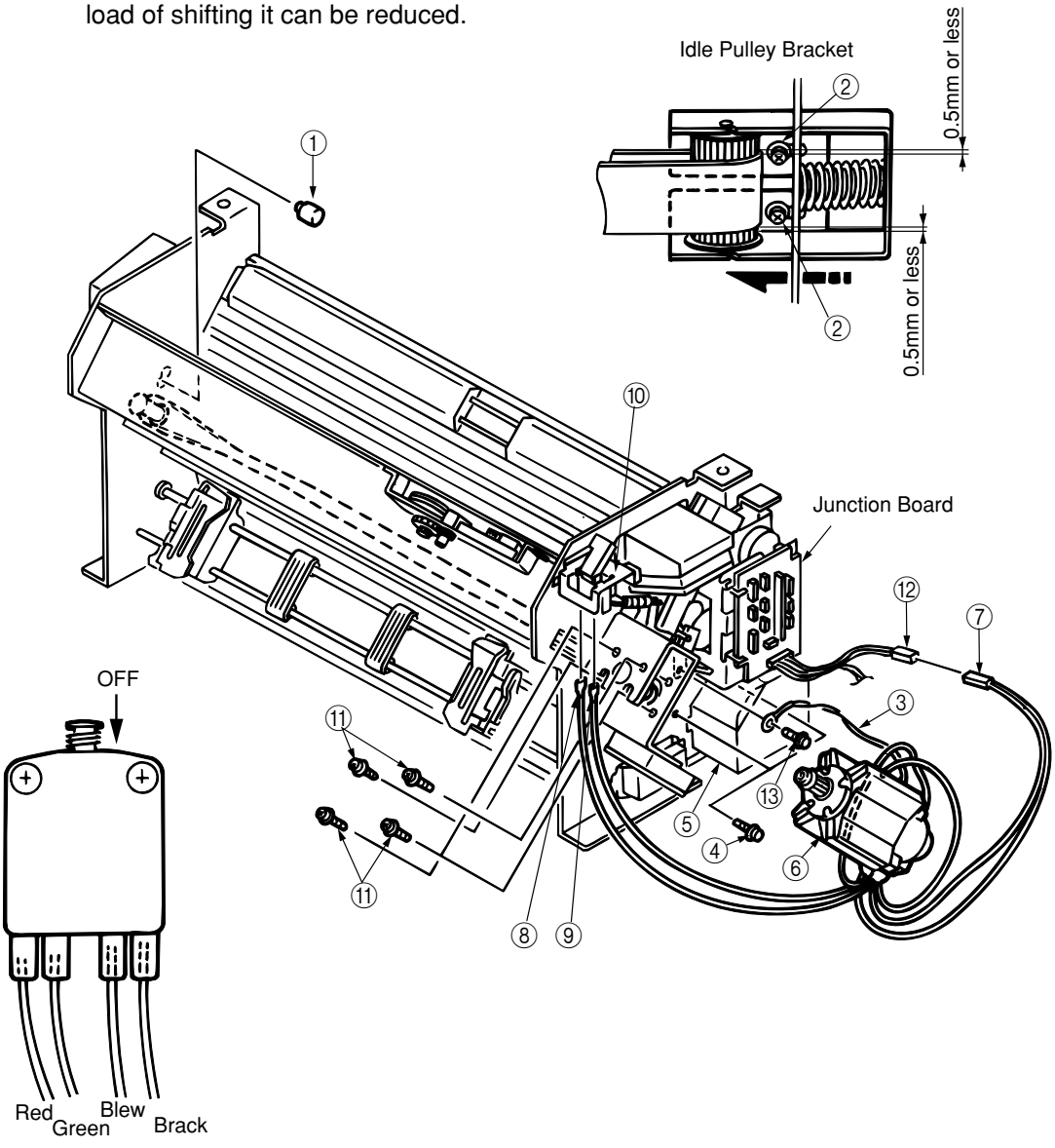
(Note on Installation)
1. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.15 Space Motor

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printer Unit. (See 3.3.2)
(3) Remove the stopper ①.
(4) Screw down 2 fixing screws ② on Idle Pulley Bracket. Move the pulley into the arrow direction to loose the belt, then fasten the screws.
(5) Remove PG Cooling Fan. (See 3.3.5)
(6) Unscrew 2 screws ④ and remove PG Fan Bracket ⑤.
(7) Unplug connectors ⑦ to Interlock Switch Cord Assy ⑫.
(8) Unplug connectors ⑧, ⑨ to Interlock Switch ⑩, and release the cords from the cordclamps on the cord route.
(9) Unscrew 1 screws ⑬ and remove FG Mesh ③.
(10) Unscrew 4 screws ⑪ and remove Space Motor ⑥.
(11) For installation, reverse the removal procedure.

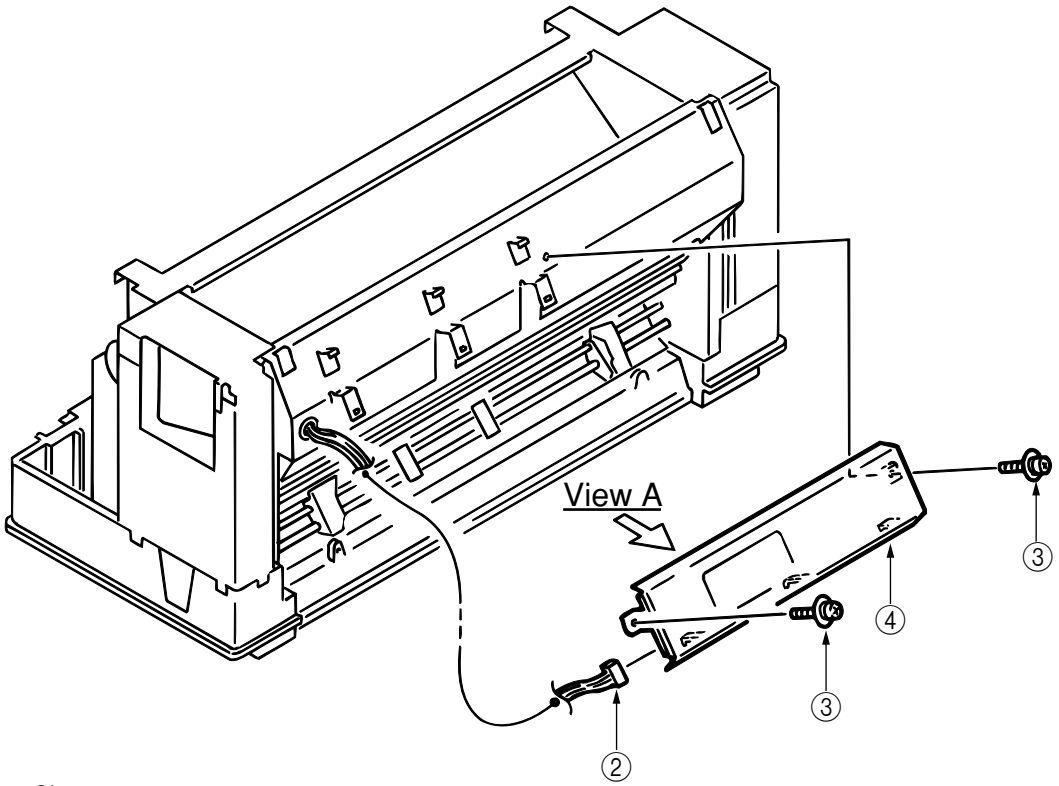
(Note on Installation)
1. After assembling the motor, adjust the position of the idle pulley bracket with screw ② so that the space belt should be positioned at the center between the idle pulley and motor pulley, and the vertical fluctuation of belt be 0.5mm or less when the carriage is shifted to right and left. When the carriage is shifted to right and left, press the interlock switch ⑩ off so that the load of shifting it can be reduced.

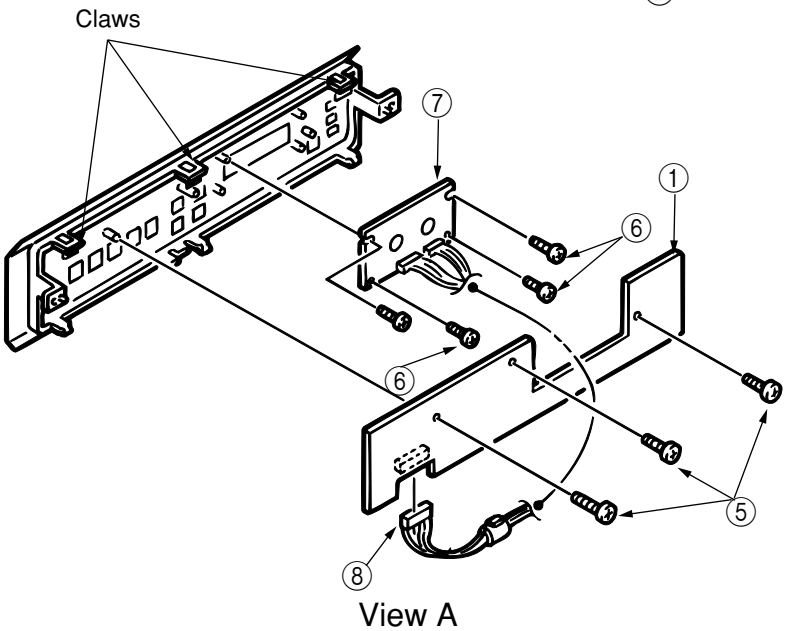


Wiring of interlok swith

3.3.16 Operation Board

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug the connector ② from Operation Board (CN1) ①
(3) Unscrew 2 screws ③ and Remove Operation Block Assy ④.
(4) Unplug the connector ⑧ from Operation Board (CN2) ①.
(5) Unscrew 3 screws ⑤ and release 3 claws, then remove Operation Board ① from Operation Block Assy ④.
(6) Unscrew 4 screws ⑥ and remove LCD Unit ⑦.
(7) For installation, reverse the removal procedure.

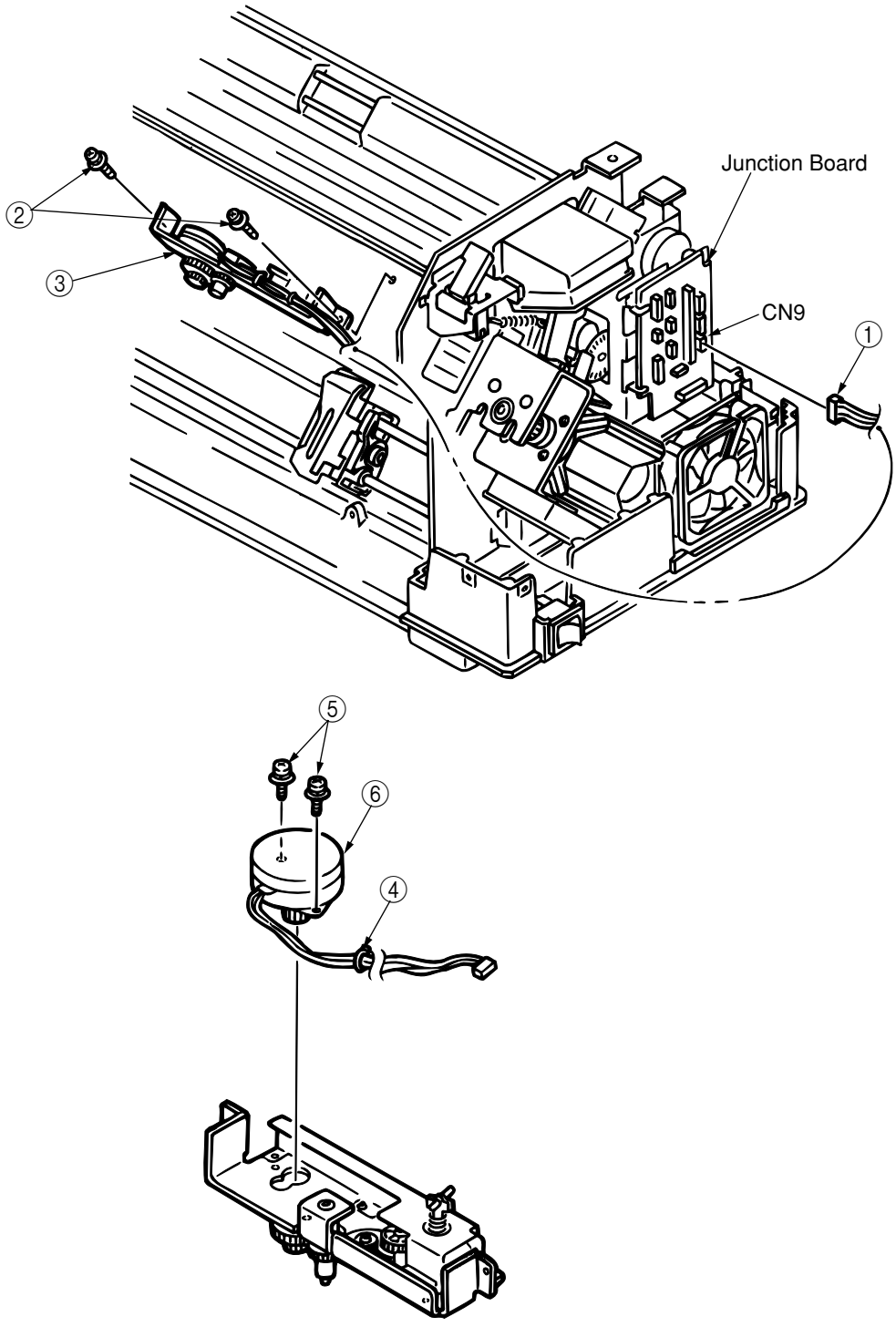




View A

3.3.17 Ribbon Feed Assy

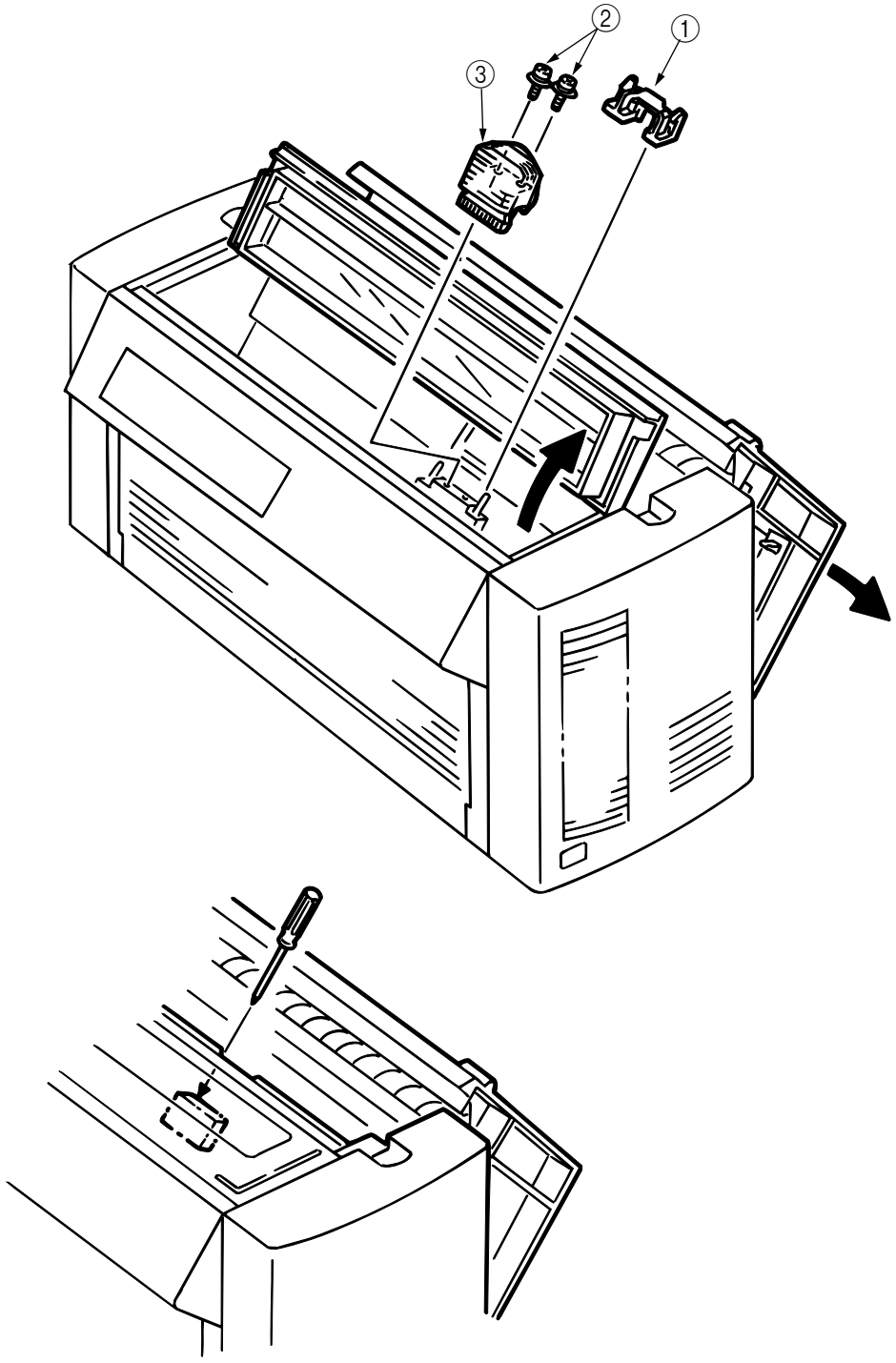
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug the connector ① from Junction Board (CN9) .
(3) Unscrew 2 screws ② and remove Ribbon Feed Assy ③.
(4) Release the cord wrapping tie ④ and unscrew 2 screws ⑤, then remove the motor ⑥.
(5) For installation, reverse the removal procedure.



3.3.18 Printhead

(1) Lean Frame Assy Rear backward and open Access Cover.
(2) Move the Printhead to the recess on the right seen from the front.
(3) Pull out Ribbon Guide ① upward.
(4) Unscrew 2 screws ② and remove Printihead ③ from the connector.
(5) For installation, reverse the removal procedure.

(Note on Installation)
1. The head should be installed according to Section 9, Procedure for Installing Print Head in 4 ADJUSTMENTS.

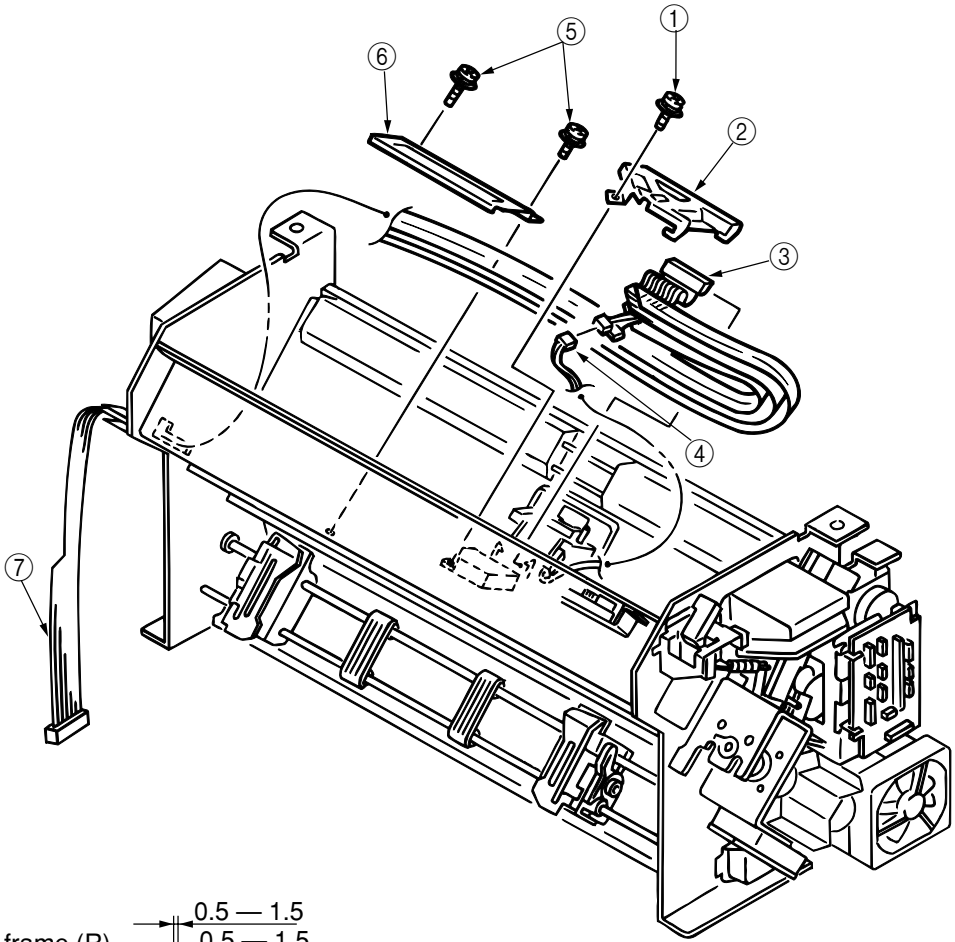


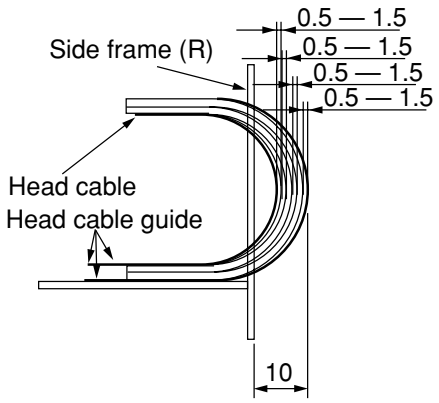
3.3.19 Head Cable

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printhead. (See 3.3.18)
(3) Remove Printer Unit. (See 3.3.2)
(4) Remove Cable Holder Cover. (See 3.3.6)
(5) Unscrew the screw ① and remove Carriage Cable Holder ②.
(6) Unplug Head Connector ③ and then the connector (green) ④.
(7) Unscrew 2 screws ⑤ and remove Head Cable Cover ⑥.
(8) Unplug Head Cable ⑦, pulling it to the left.
(9) For installation, reverse the removal procedure.

(Note on Installation)

1. When the head cable is assembled, make sure that 0.5 - 1.5mm clearance between cables should be secured and the amount of protrusion from the side frame (R) should be approx. 10mm on condition that the carriage is dhifted to the left end.



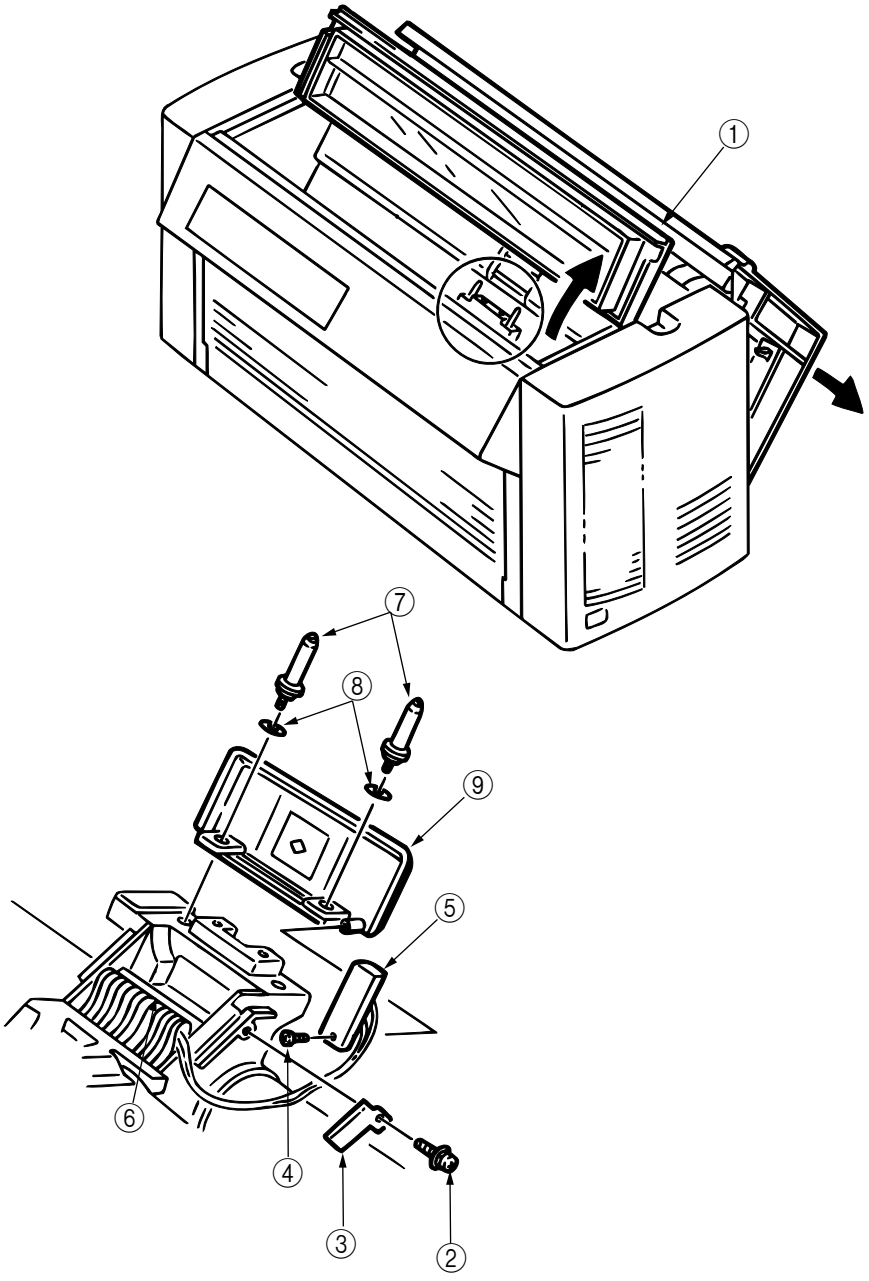


The condition of cables when the carriage is shifted to the left end

3.3.20 Ribbon Protector

(1) Remove Printhead. (See 3.3.18)
(2) Open Access Cover ①.
(3) Unscrew the screw ② and remove the cord clamp ③.
(4) Unscrew the screw ④ and remove Paper Width Sensor ⑤.
(5) Unplug the connector ⑥.
(6) Remove 2 Ribbon Guide Posts ⑦ and 2 washers ⑧.
(7) Remove Ribbon Protector ⑨.
(8) For installation, reverse the removal procedure.

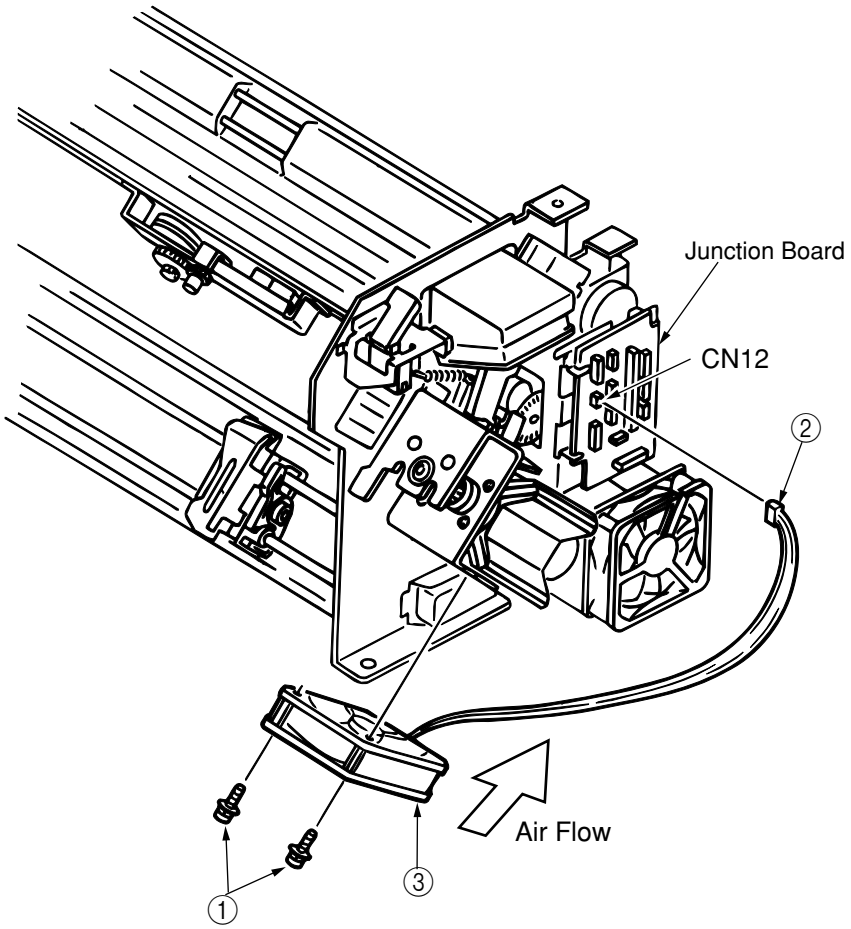
(Note on Installation)
1. In assembling the ribbon protector, make an adjustment according to the Section 1 (2) Protector Gap of 4. ADJUSTMENTS.



3.3.21 Space Motor Cooling Fan

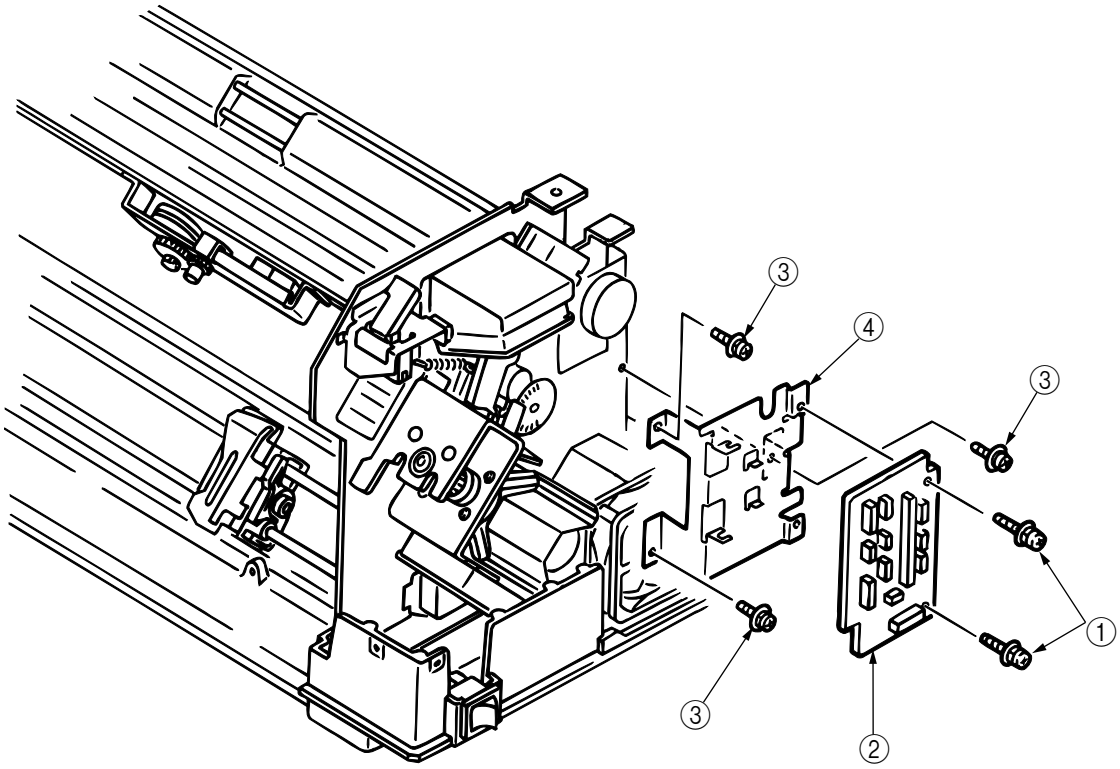
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printer Unit. (See 3.3.2)
(3) Unscrew 2 screws ① and unplug the connector ② from Junction Board (CN12) , then remove Space Motor Cooling Fan ③.
(4) For installation, reverse the removal procedure.

(Note on Installation)
1. The fan should be installed, matching the direction of air flow to the direction of arrow shown in the figure.



3.3.22 Junction Board

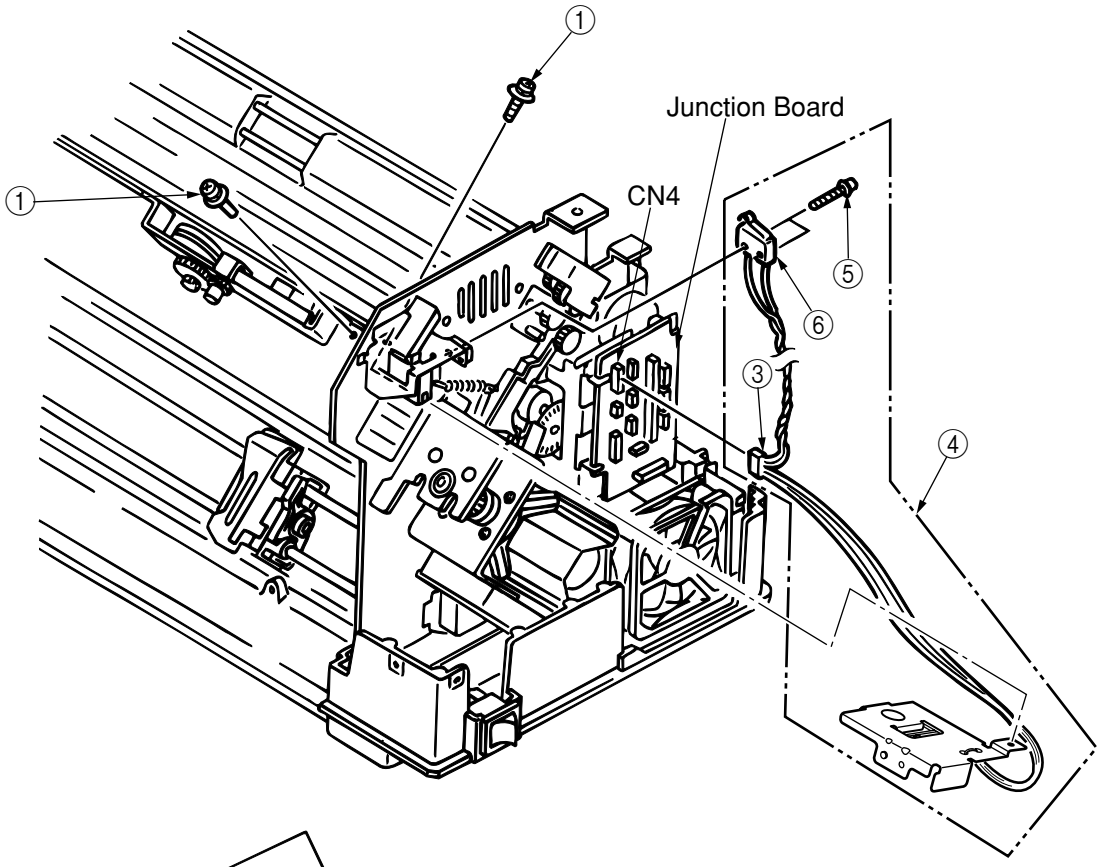
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug all the connectors from the above.
(3) Unscrew 2 screws ① and remove Junction Board ②.
(4) Unscrew 3 screws ③ and remove Junction Board Bracket ④.
(5) For installation, reverse the removal procedure.

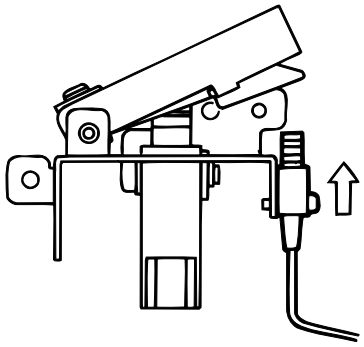


3.3.23 Cover Open Switch Assy / Ribbon Rotation Sensor

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Head Cooling Fan 1. (See 3.3.13)
(3) Unscrew 2 screws ①.
(4) Unplug the connector ③ from Junction Board (CN4) , then remove Cover Open Switch Assy / Ribbon Rotation Sensor ④.
(5) Unscrew 2 screws ⑤ and remove Cover Open Switch Assy ⑥.
(6) For installation, reverse the removal procedure.

(Note on Installation)
1. In assembling the microswitch, position it until backlash is removed.



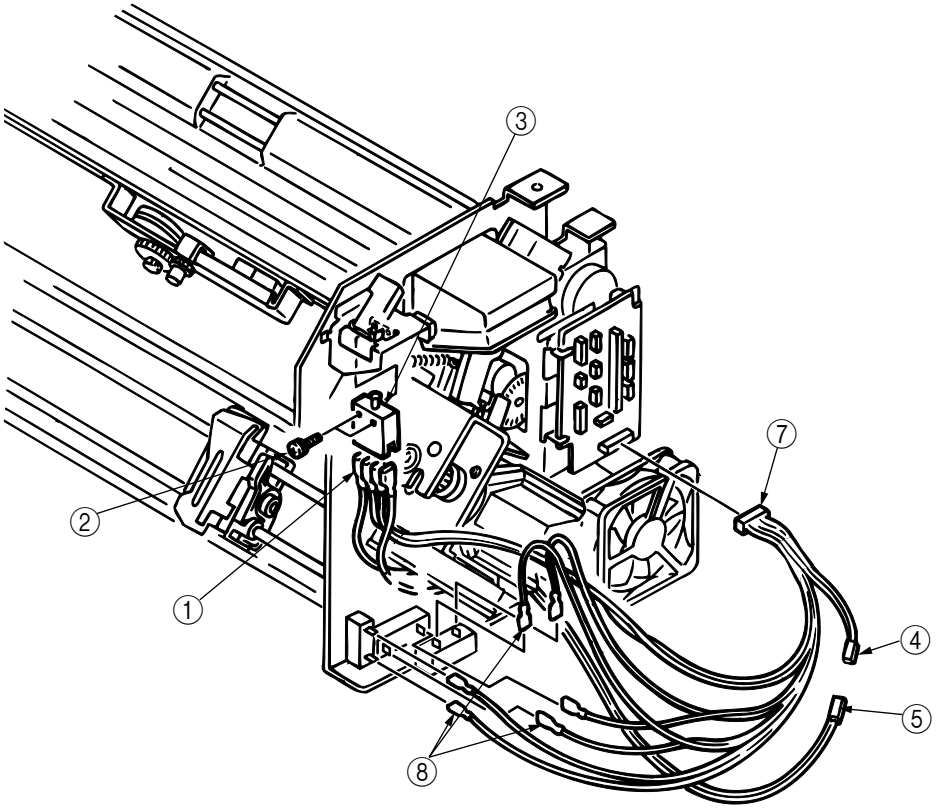


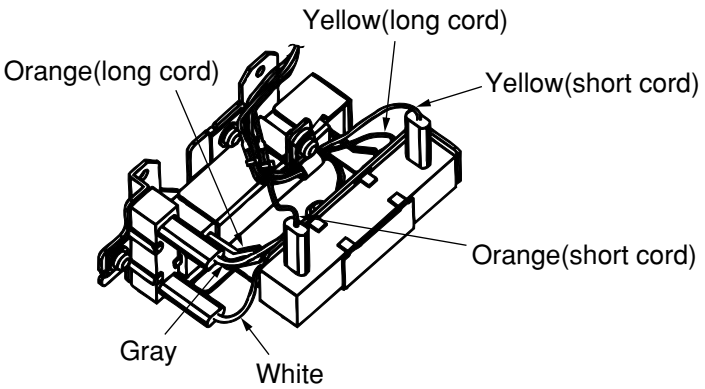
Note1
In installing the microswitch,raise it in the direction of arrow until backlash is removed.

MicroSW assembly detail

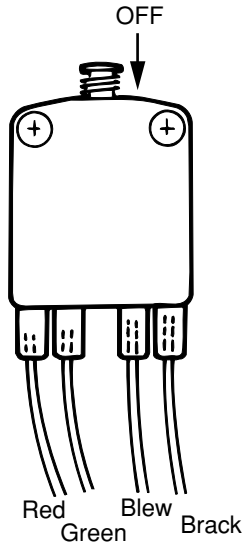
3.3.24 Interlock Switch / Interlock Switch Cord Assy

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unplug 4 cables ①.
(3) Unscrew 2 screws ② and remove Interlock Switch ③.
(4) Unplug 6 connectors ⑧.
(5) Unplug connectors ④ to Spacing motor code ⑤.
(6) Unplug Interlock Switch Cord Assy ⑦ from the cable clamp.
(7) For installation, reverse the removal procedure.





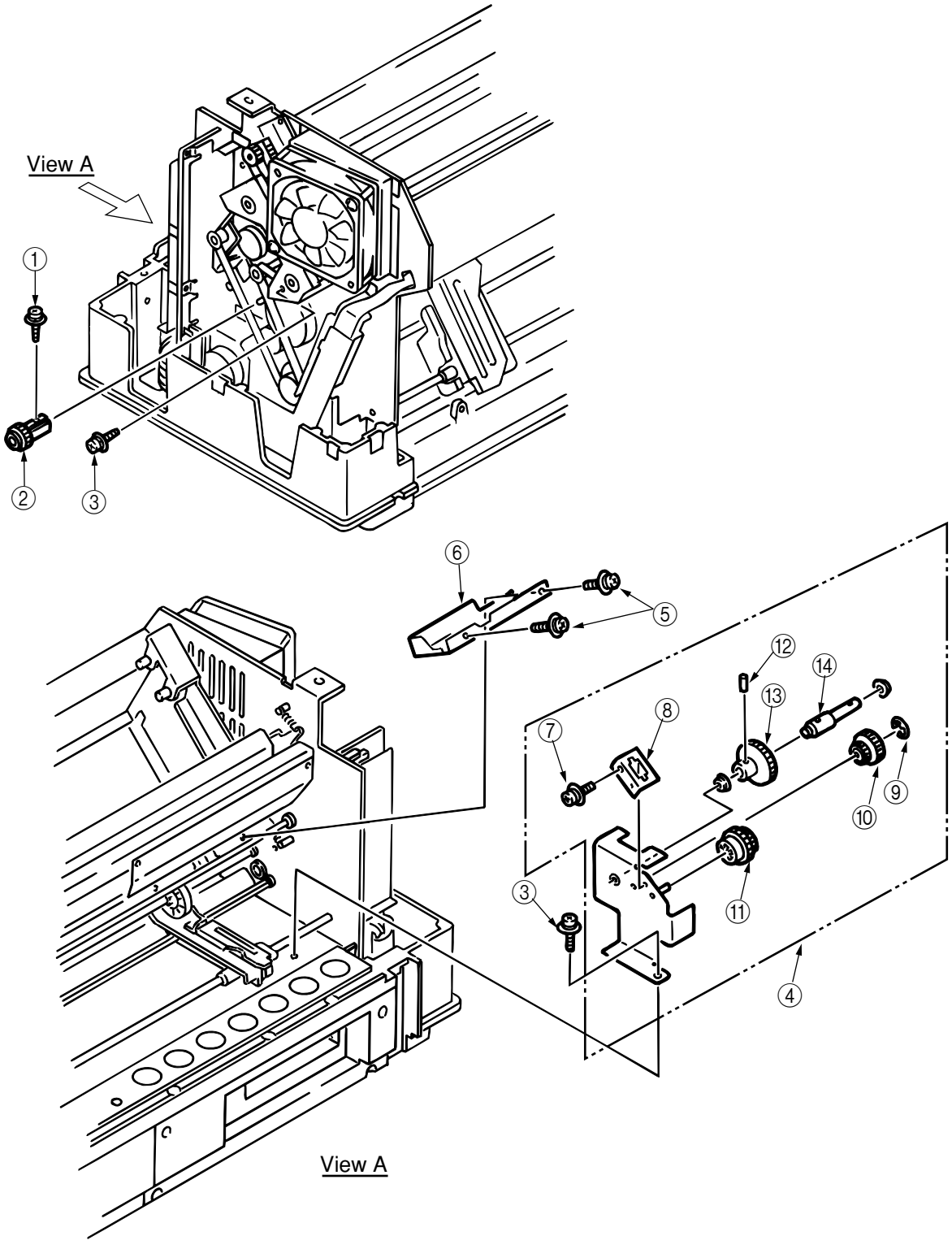
Detail drawing



Wiring of interlok swith

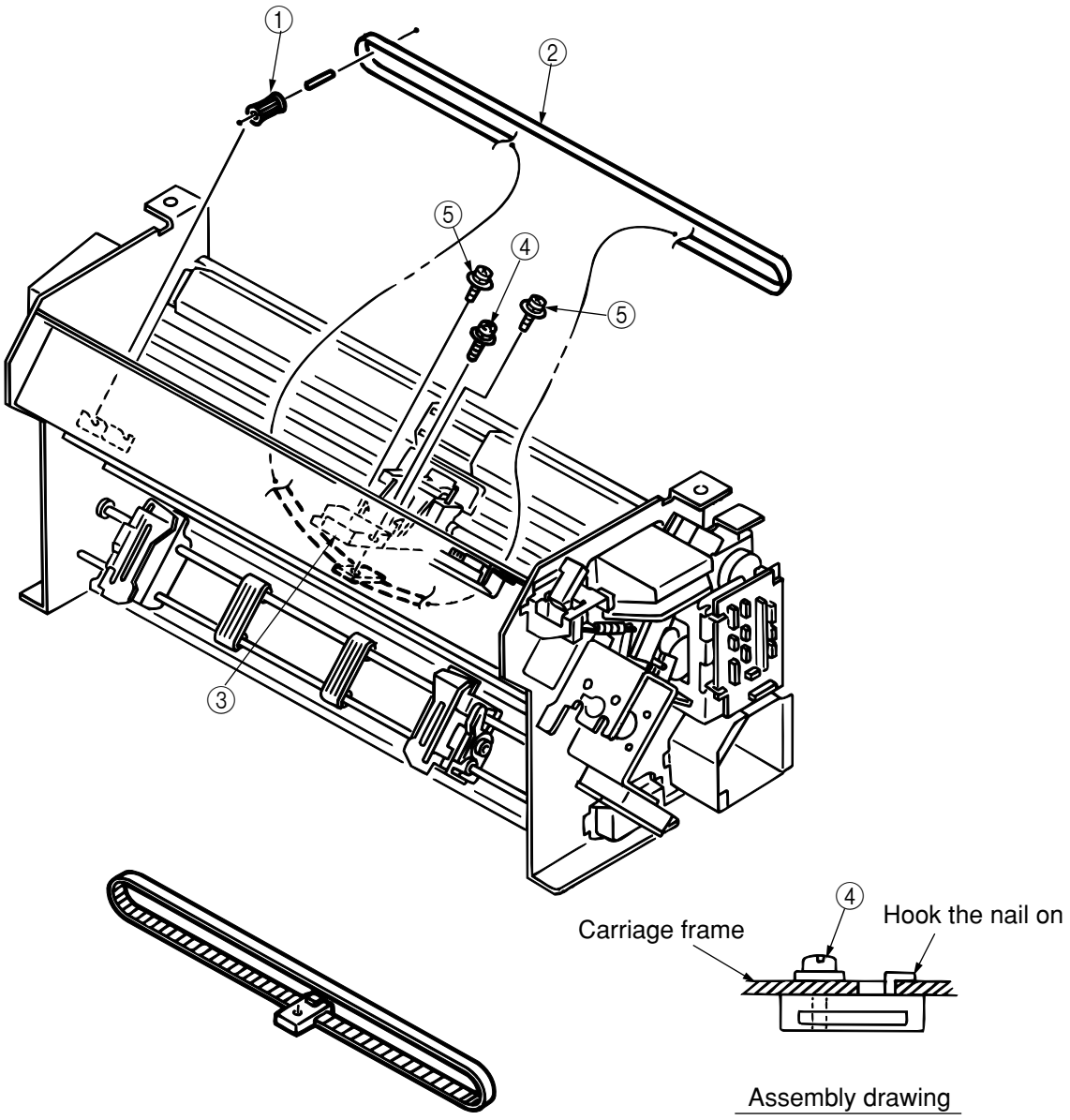
3.3.25 Knob Bracket Assy

(1) Remove Bail Motor. (See 3.3.11)
(2) Unscrew the screw ① and remove the gear ②.
(3) Unscrew 2 screws ③ and remove Knob Bracket Assy ④.
(4) Unscrew 2 screws ⑤ and remove AG Sensor Cover ⑥.
(5) Unscrew the screw ⑦ and remove Knob Cover ⑧.
(6) Remove the E-ring ⑨, Gear ⑩ and Adjusting Knob ⑪.
(7) Remove Spring Pin ⑫, then remove Idle Gear Shaft ⑬ and CSF Drive Shaft ⑭.
(8) For installation, reverse the removal procedure.



3.3.26 Space Belt

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Space Motor. (See 3.3.15)
(3) Remove Printhead. (See 3.3.18)
(4) Remove Idle Pulley ① from Idle Pulley Bracket, then remove Space Belt ②.
(5) Unscrew ⑤ screw and pull out Connector Guide ③, unscrew the screw ④ and remove Space Belt ②.
(6) For installation, reverse the removal procedure.

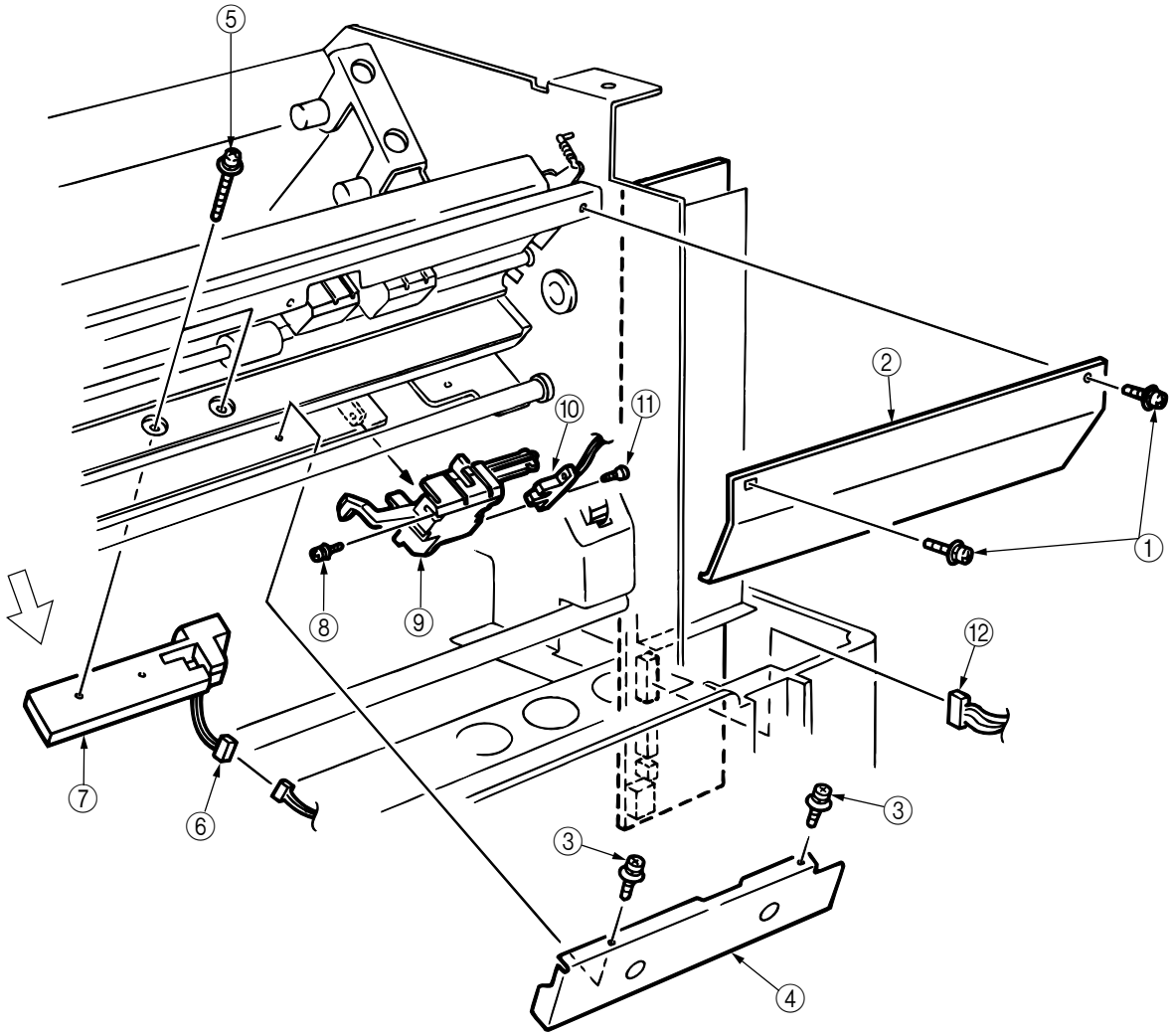


Assembly drawing

3.3.27 AG Sensor Frame / Start Searching Sensor

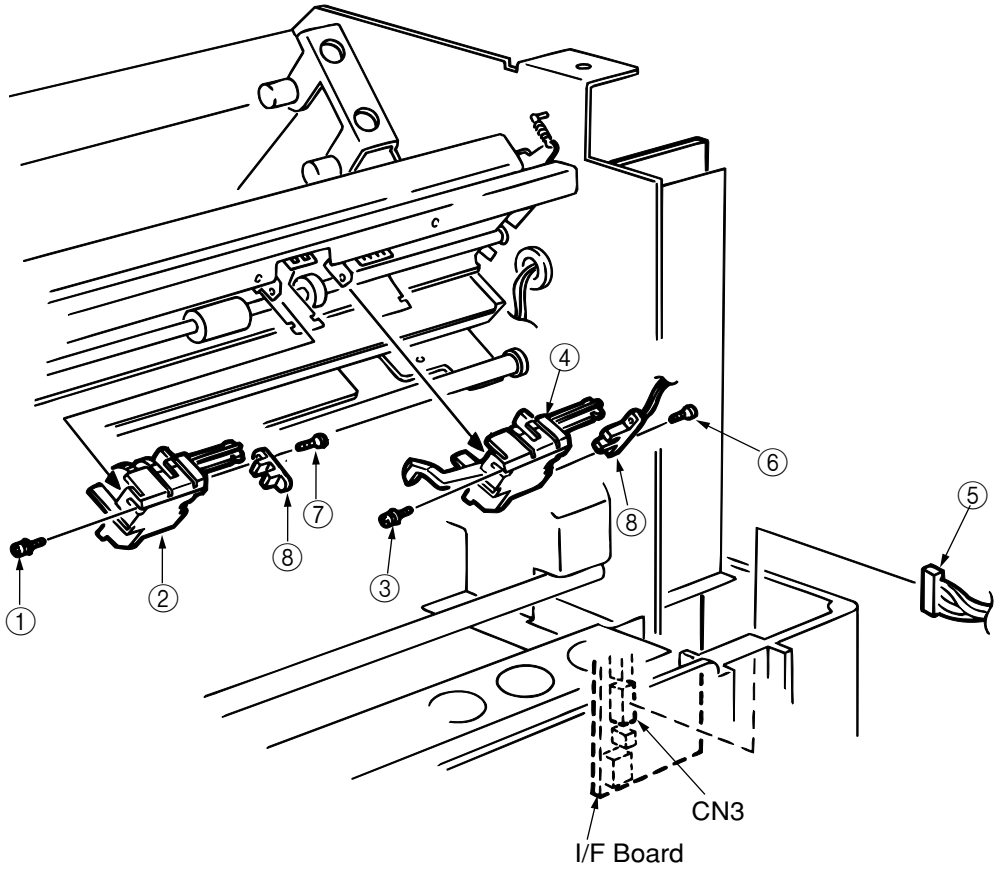
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew 2 screws ① and remove Rear Plate ②.
(3) Unscrew 2 screws ③ and remove AG Sensor Cover ④.
(4) Unscrew 2 screws ⑤, unplug the connector ⑥ and remove AG Sensor Frame ⑦.
(5) Unscrew the screw ⑧ and release the latch, then remove Start Searching Sensor Lever Assy ⑨ and Start Searching Sensor Cord ⑩ together.
(6) Unscrew the screw ⑪ and unplug the connector ⑫ from I/F Board (CN9), then unplug Start Searching Sensor Cord ⑩.
(7) For installation, reverse the removal procedure.

(Note on Installation)
1. In assembling AG sensor frame ⑦, it should be pulled in the direction of arrow shown in the figure.
2. After assembling the AG sensor frame ⑦, check the AG plate gap as stated in Section 2 of 4 ADJUSTMENTS and execute the auto gap correction as stated in Section 3.



3.3.28 Paper Jam Sensor Assy / Bail PE Sensor Assy

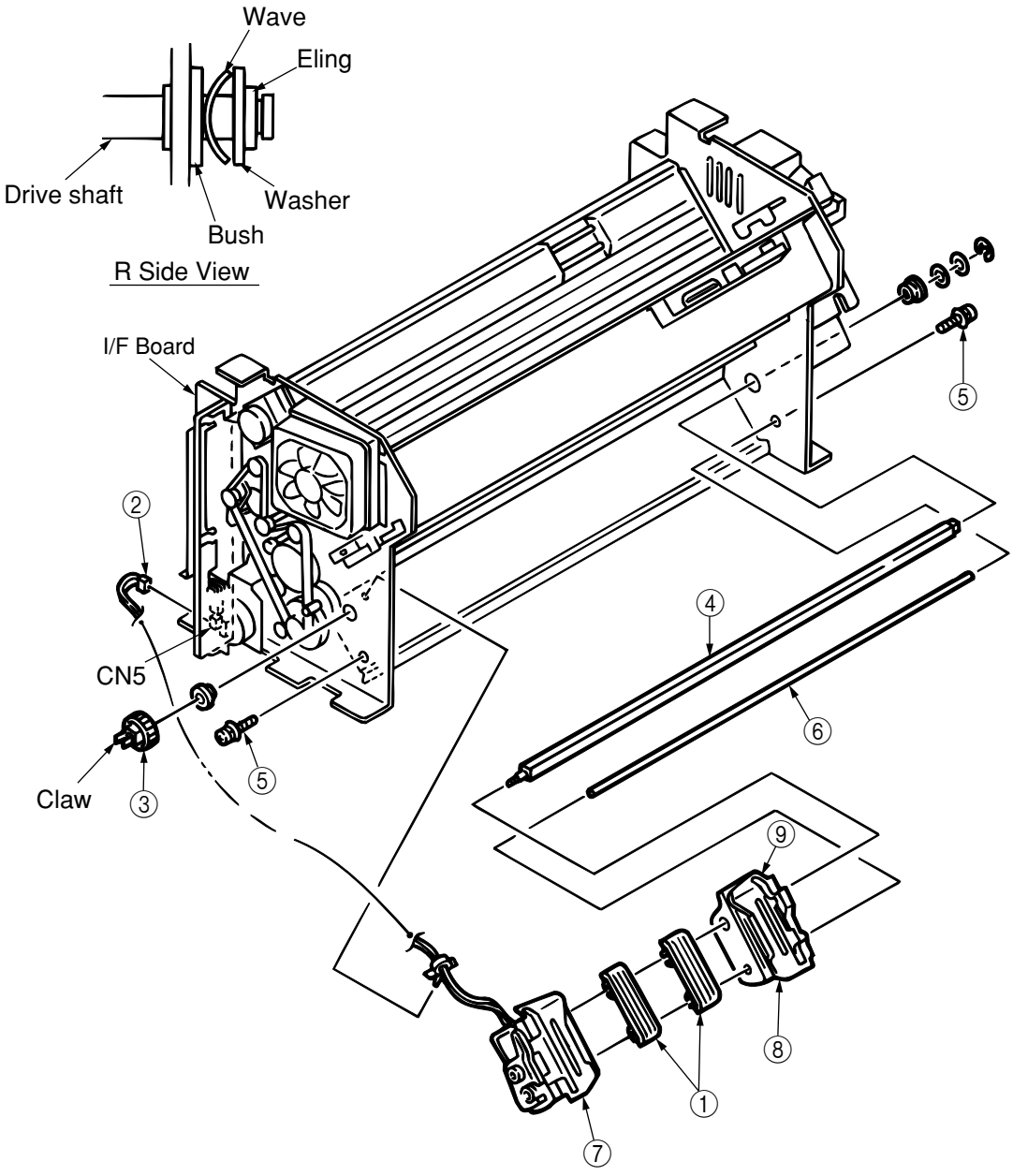
(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Unscrew the screw ① and release the latch, then remove Paper Jam Sensor Assy ②.
(3) Unscrew the screw ③ and release the latch, then remove Bail PE Sensor Assy ④.
(4) Unplug the connector ⑤ from I/F Board (CN3).
(5) Unscrew 2 screws ⑥, ⑦ and remove Paper Jam Sensor ⑧.
(6) For installation, reverse the removal procedure.



3.3.29 Sprocket Assy (L) (R) (Front Tractor)

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printer Unit. (See 3.3.2)
(3) Remove Space Motor Fans. (See 3.3.21)
(4) Remove 2 Sheet Guides ①.
(5) Unplug the connector ② from I/F Board (CN5) .
(6) Release cords at cord clamps and remove the Snap Band.
(7) Release the claw to remove Front Tractor Drive Gear ③.
(8) Pull out Front Tractor Drive Shaft ④ to the right.
(9) Unscrew 2 screws ⑤ and remove Front Lock Shaft ⑥, Sprocket Assys (L) ⑦ and (R) ⑧ together.
(10) Release Lock Lever ⑨ and pull out Sprocket Assys (L) ⑦ and (R) ⑧ from Front Lock Shaft ⑥.
(11) For installation, reverse the removal procedure.

(Note on Installation)
1. Adjust sprocket pin phases of Sprocket Assys (L) ⑦ and (R) ⑧, before inserting Front Tractor Drive Shaft ④ into them.

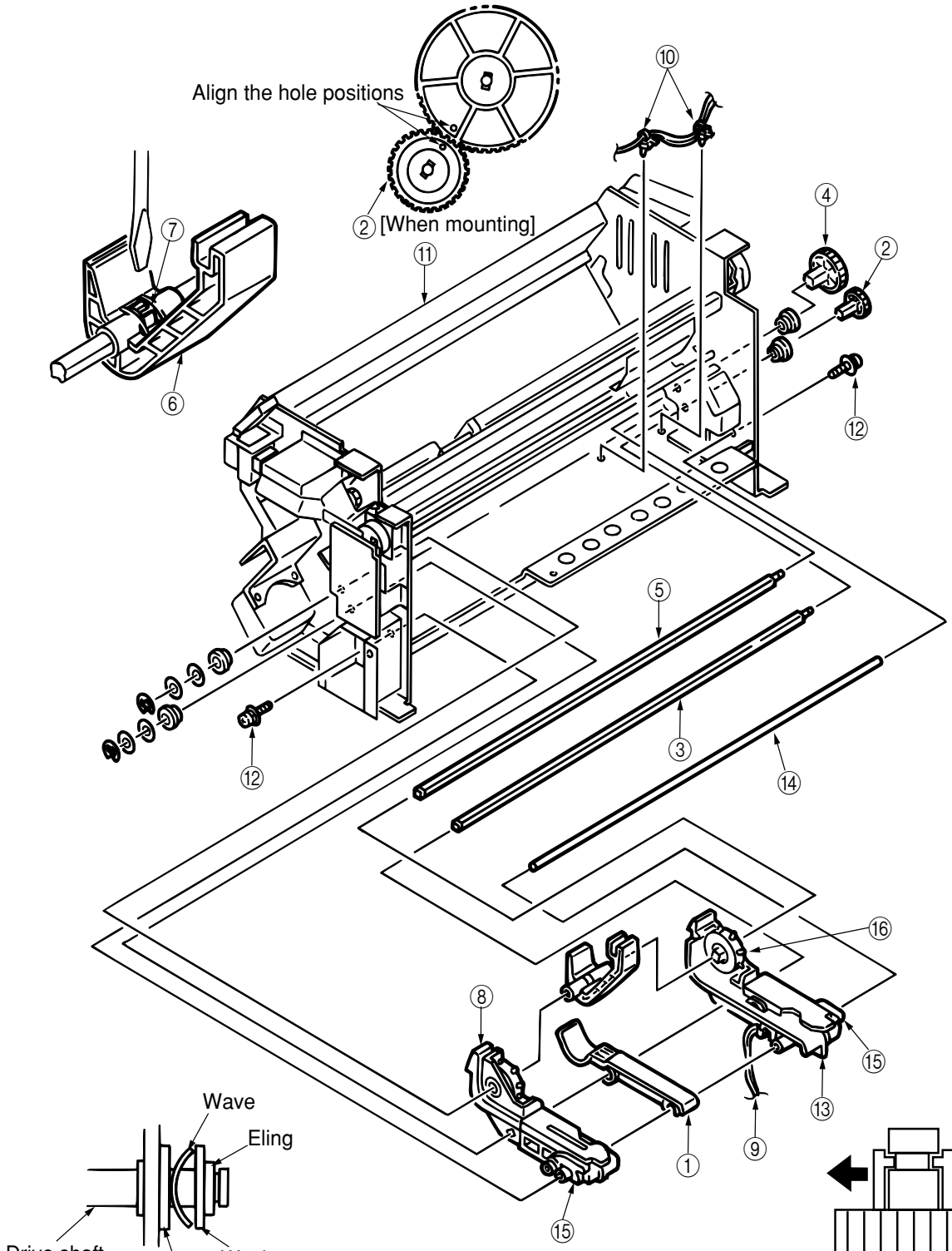


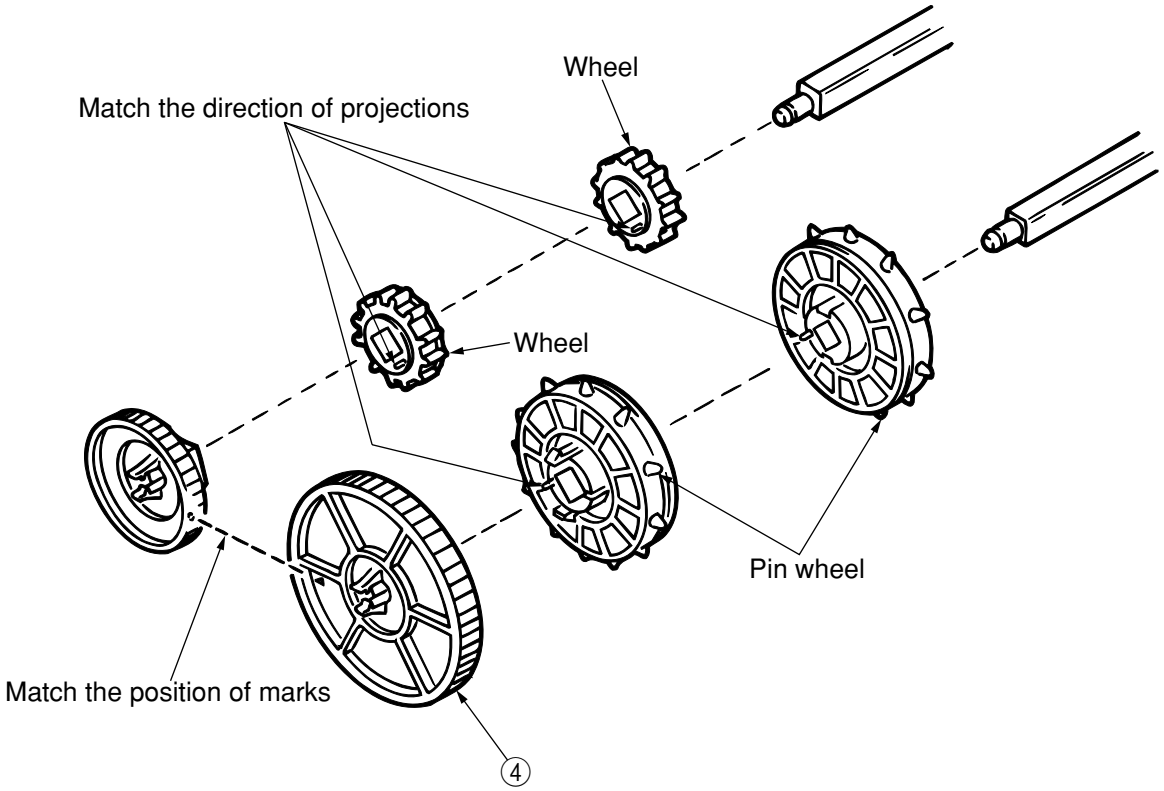
3.3.30 Sheet Feeder Assy (L) Rear / Sheet Feeder Assy (R) Rear

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Printer Unit. (See 3.3.2)
(3) Remove PG Cooling Fan. (See 3.3.5)
(4) Remove Mini Pitch Belt. (See 3.3.9)
(5) Remove I/F Board. (See 3.3.6)
(6) Remove Center Guide Lower ①.
(7) Open the clamp of Drive Gear ② to the arrow direction and remove the gear, then pull out Rear Tractor Drive Shaft ③.
(8) Open the clamp of Rear Tractor Drive Gear ④ to the arrow direction and remove the gear, then pull out Rear Tractor Drive Shaft ⑤. At this time, Center Guide Upper ⑥ and Friction Piece ⑦ come off together.
(9) Remove 2 Snap Bands ⑩ fastening Micro Switch Connecting Cord ⑨ on Sheet Feeder Assy (L) Rear ⑧, from Main Frame Assy ⑪. Then release the cords from the clamps on the cord route.
(10) Unscrew 2 screws ⑫ on the right and left then remove Lock Shaft ⑭ with Sheet Feeder Assy (L) Rear ⑧ and Sheet Feeder Assy Rear (R) ⑬ on.
(11) Release Lock Lever ⑮ and remove Sheet Feeder Assy (L) Rear ⑧ and Sheet Feeder Assy Rear (R) ⑬ from Lock Shaft ⑭.
(12) For installation, reverse the removal procedure.

(Note on Installation)

1. Mount Sheet Feeder Assy (L) Rear ⑧ between 2 protrusions B on Main Frame Assy ⑪.
2. Mount Rear Tractor Drive Shafts ③ and ⑤ as follows:
   (a) Adjust the position of Sprocket Wheel ⑭ protrusion at right and left pin tractors to that of Rear Tractor Drive Gear ④ hole, then insert Rear Tractor Drive Shaft ⑤.
   (b) Adjust the position of Pin Wheel ⑯ protrusion at right and left pin tractors then insert Rear Tractor Drive Shaft ③.
   (c) Adjust the position of Pin Wheel ⑯ protrusion to that of Drive Gear B ② hole, align the holes at Rear Tractor Drive Gear ④ and at Drive Gear B ② then mount Drive Gear B ② on Rear Tractor Drive Shaft ③.
3. Give friction to Friction Piece ⑦ with a screwdriver turned 45 degrees, after inserting it into Rear Tractor Drive Shaft ⑤.
   Slow moving of Center Guide Upper ⑥ to the right/left means the right installation, and smooth one means the false installation.


Align the hole positions
② [When mounting]
⑩
⑦
⑪
④
②
⑥
⑫
⑤
③
⑫
⑭
⑯
⑧
⑮
⑬
⑨
①
⑮
Wave
Eling
Drive shaft
Washer
Bush
R Side View
Releasing the Gear latches



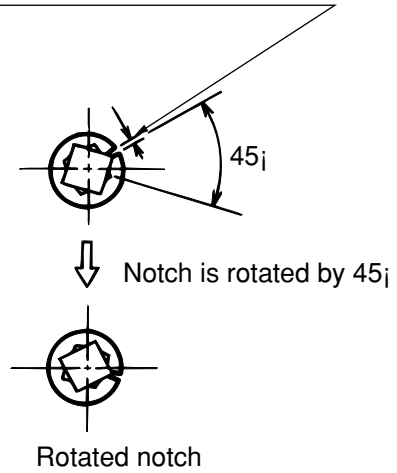
Rear tracor Assy Gears phase drawing

1. Matching the phase of pin tractors

a. Match the direction of pin wheel projections on right/left pin tractor to that of mark on the ② (rear tractor drive gear).

b. Match the direction of wheel projections on right/left pin tractor to that of mark on ④ (drive gear B), and install ② (drive gear B) to ⑤③ (rear drive shaft of the rear tractor Assy) at a position where the directions of marks on ④ (drive gear B) and ② (rear tractor drive gear) match.

Open up the notch to 1mm and assemble it, positioning the notch as shown in figure.

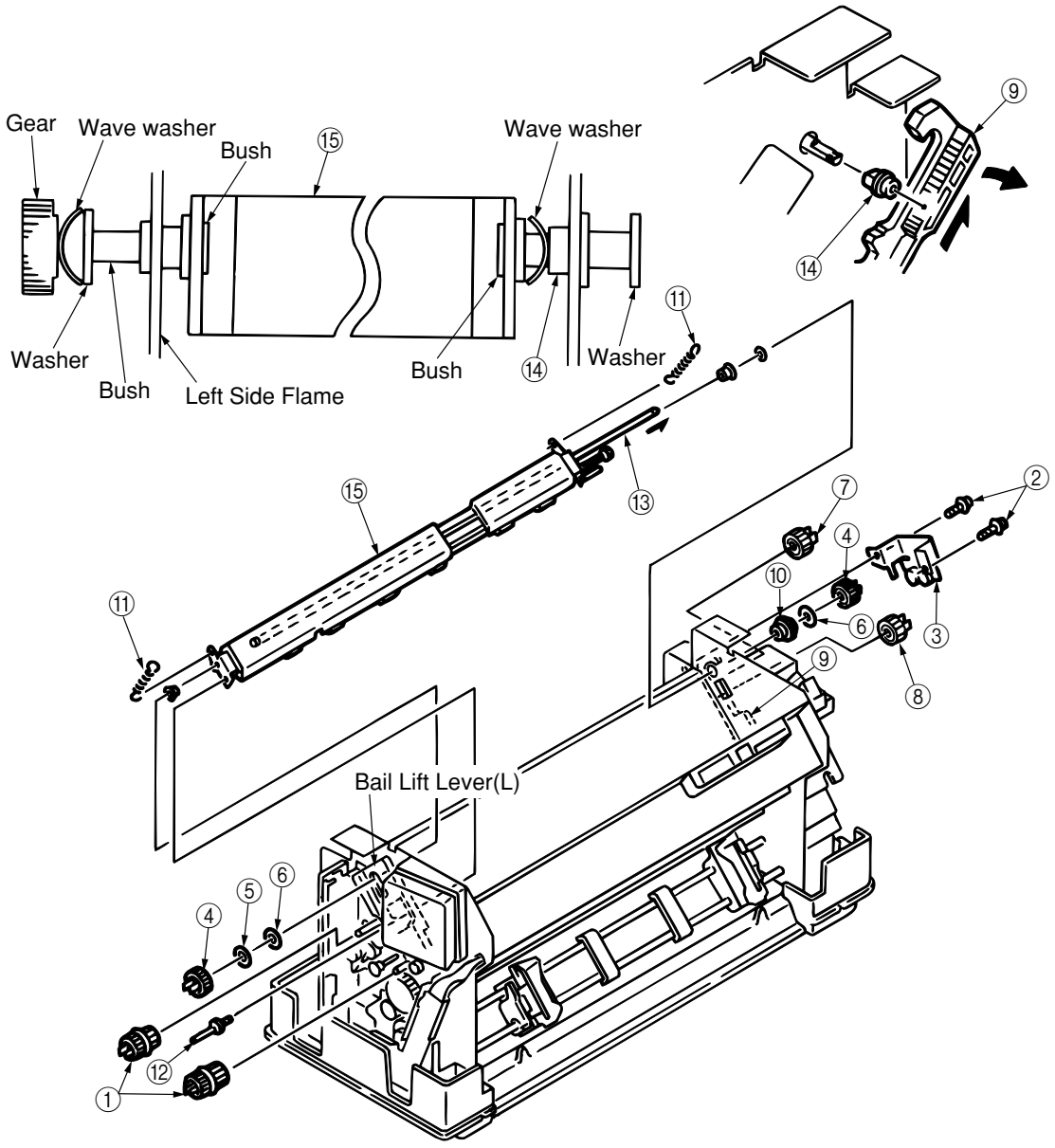


⑧ Assembling friction piece

3.3.31 Bail Assy

(1) Remove Cover Assy Access / Cover Assy Side (R) / Cover Assy Side (L) /Cover Assy Front / Frame Assy Rear / Plate Front (stuck). (See 3.3.1)
(2) Remove Mini Pitch Belt. (See 3.3.9)
(3) Remove Bail Motor Assy (See 3.3.11)
(4) Remove 2 Drive Pulleys ①.
(5) Unscrew 2 screws ② and remove Bail Gear Assy ③.
(6) Release the claws at right/left Drive Gears B ④ then remove Drive Gears B ④, Wave Washers ⑤ and Flat Washers ⑥.
(7) Slide Bail Lift Lever (R) ⑨, Drive Gear B ⑦ and Drive Gear C ⑧ to the oblique upper direction and remove Bearing (Bail) ⑩.
(8) Remove 2 Bail Springs ⑪.
(9) Remove Screw Stud ⑫.
(10) Slide Bail Support Shaft ⑬ to the right then remove it from left Bearing (Bail) ⑭.
(11) Lift Bail Assy ⑮ to the oblique upper direction and pull it out to the left.
(12) For installation, reverse the removal procedure.

(Note on Installation)
1. The wave washers should be attached, paying attention to the direction of them.
2. The phase of bail lift lever (L), (R) should be matched in assembling them.



4. ADJUSTMENTS

(1) Be sure to carry out this adjustment with the printer mechanism mounted on the lower cover.

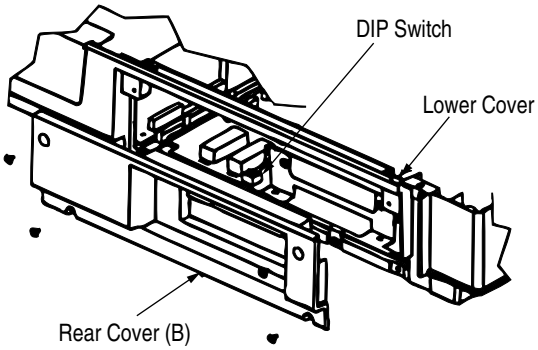
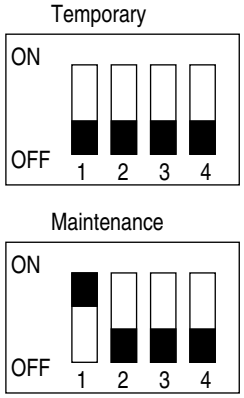
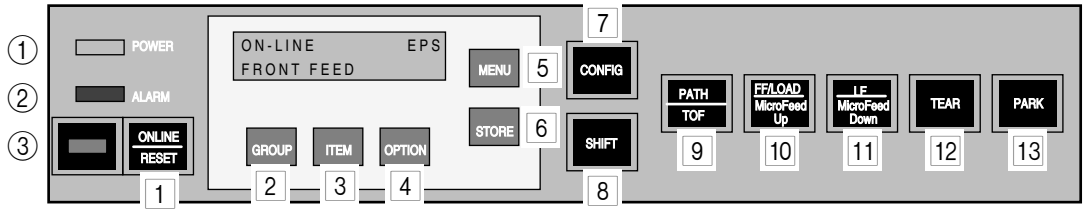
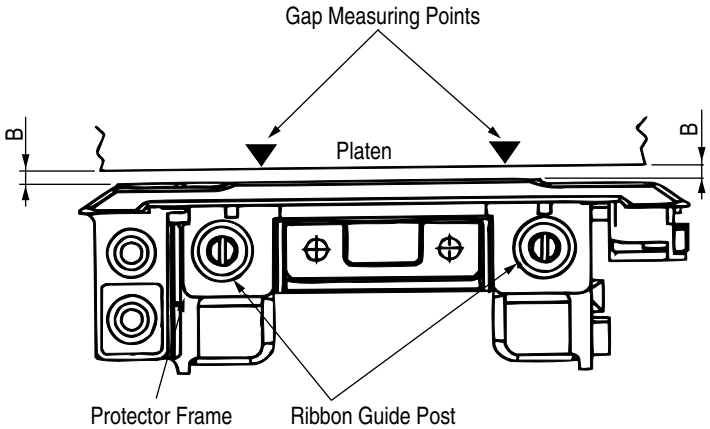
(2) Be sure to carry out this adjustment operation on a level and highly rigid work table (flatness: less than 0.039 inch or 1 mm) so as to minimize adjustment error.

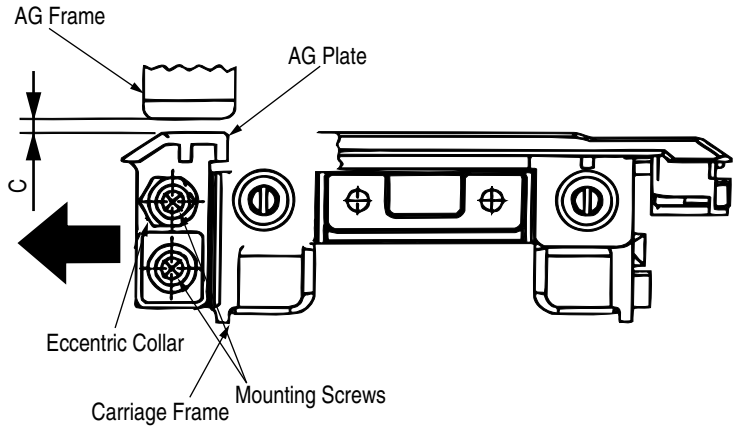
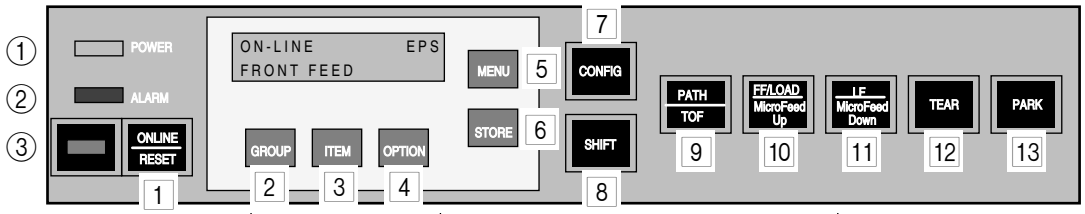
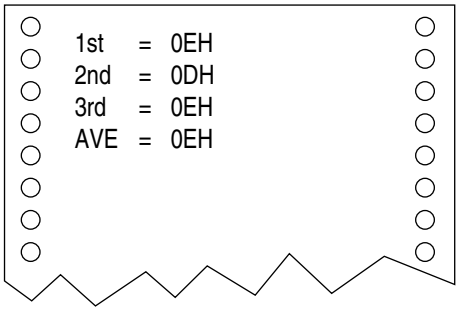
[Service Tool]
- No. 2-200 Philips screwdriver
- No. 2-200 screwdriver
- Feeler gauge
- 500 g rod tension gauge
- Calipers

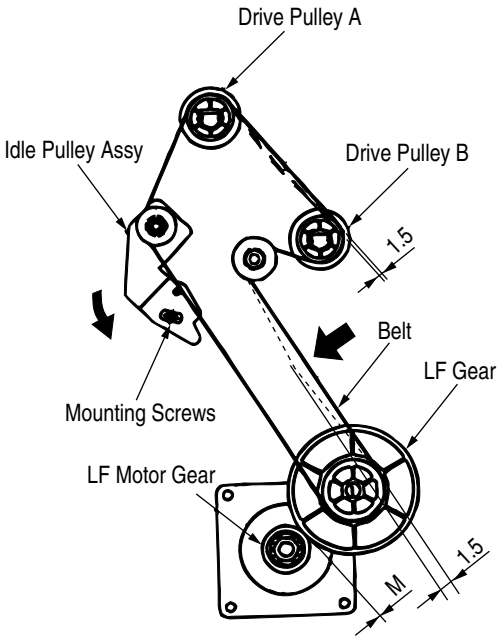
Adjustment should be conducted after removing the Rear Cover (B) and setting the Dip Switch 1 on the board to “ON”(maintenance mode). (See Note 1 and 2)

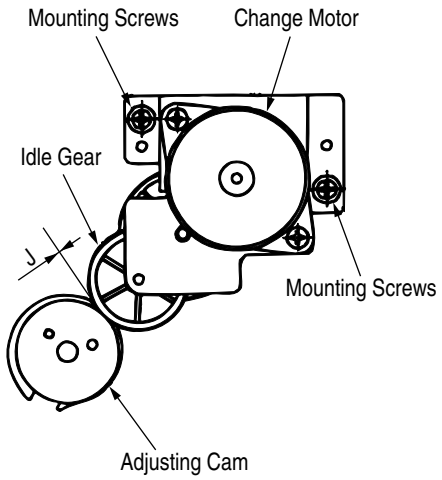
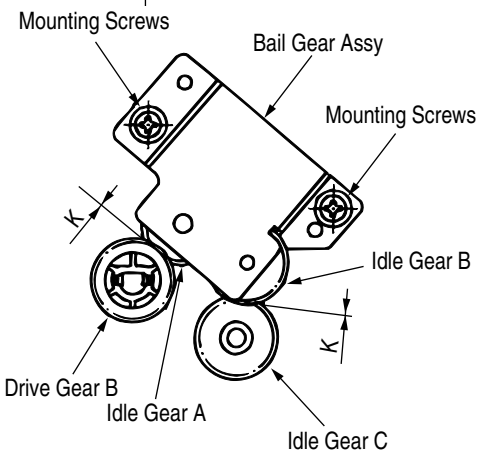
Note 1: After the adjustment and lubrication have completed, set the all the dip switches to “OFF”(normal operation mode), and fix the Rear Cover (B) with the mounting screws.

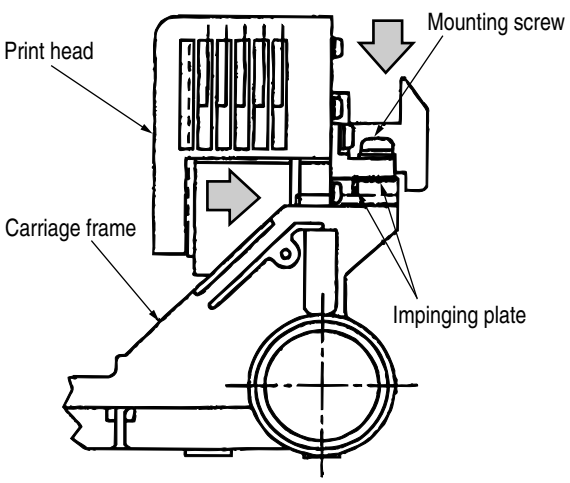
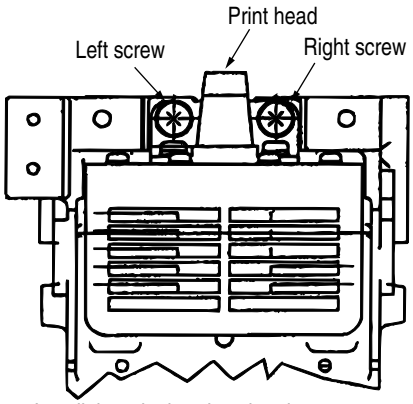
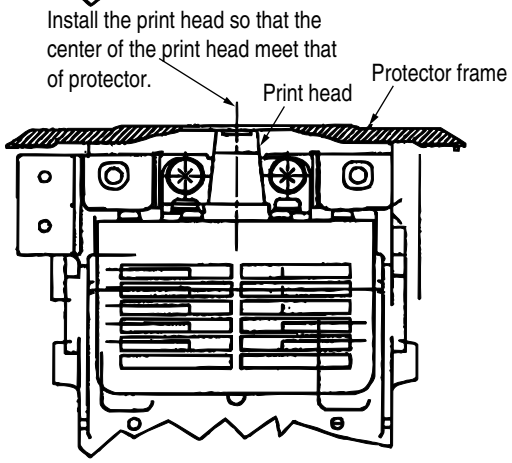
Note 2: The local test printing except for the menu printing should be implemented with all the dip switches set to “OFF”(normal operation mode).

Item No.	Items	Standard Value	Illustration	Adjustment Method
1	Protector Gap Adjustment (1)Range Adjustment			①Remove the Rear Cover (B), and set Dip Switch 1 on the board to “ON” (maintenance mode). 
				②Close the access cover, and turn on the printer while pressing Switches 7 and 10 on the operation panel. (This starts the auto gap adjusting mode.) The platen moves forward/ backward up to the adjusted position. ③When the platen stops, turn off the printer.
	(2)Protector Gap			①Insert the thickness gauge between the platen and the protector frame to verify the protector gap value B is between 0.12 and 0.16 mm. Notes: Although the adjustment should use a range from 0.12 to 0.16mm, the configuration should use a range from 0.09 to 0.2mm ②If adjustment is required, screw down the ribbon guide post with the Philips screwdriver and adjust the protector frame to make the protector gap value B between 0.12 and 0.16 mm, then fix the protector frame. Notes: a) The protector frame should be mounted parallel with the platen, when measured at the right/left gap measuring points.

Item No.	Items	Standard Value	Illustration	Adjustment Method
2	AG Plate Gap	C=0.14±0.02mm		①Insert the thickness gauge between the AG frame and the AG plate to verify the gap value C is between 0.12 and 0.16 mm. ②If adjustment is required, screw down the mounting screws and adjust the eccentric collar to make the protector gap value C between 0.12 and 0.16 mm, then fix the AG plate. Notes: After this Adjustment, the Auto Gap Correction should be conducted (See item 3)
3	Auto Gap Correction			①Set the continuous form (1P, 15 in. wide and 55 Kg) at the printing valid position and also the ribbon cassette.
				②Turn off the printer, then power on again while pressing Switches 12 and 13 to conduct the auto correction. If the auto gap operation has been repeated 3 times and "Av= " printed, it is the end of the auto gap correction.
			③Turn on the printer while pressing Switches 12 and 13.	
				③The auto correction value from 09 H to 18 H is desirable. If any value other than this is indicated, the AG plate gap should be adjusted again. (See Item 2) Notes: a) In the following cases, this adjustment should be implemented. i)After the gap adjustment between the AG frame and the AG plate; ii)After replacing the control board. (not required after CG/PROGROM, EEPROM replacement)
			④The auto gap correction has completed if "Av" is printed.	b) When the correction value "Av= " is not between 09 and 18, "Warning" will be indicated on the LCD panel. Press Switch 1 to reset this warning. c) The correction value "Av= " from 09 to 18 is desirable. If any value other than this is indicated, the gap between the AG frame and the AG plate should be adjusted again to the proper range as described in Item 2. Then, conduct this correction.

Item No.	Items	Standard Value	Illustration	Adjustment Method
4	LF Motor Belt Tension	200 ~ 250gf		①Adjust the LF motor belt tension, with the idle pulley assy, to produce the standard value when the belt is deflected 1.5 mm at the middle of the LF gear and the drive pulley B.
5	Slice Level Setting-Paper Width Sensor			①Install the ribbon cassette only. ②Turn on the printer while pressing Switches 9 and 11 at the operation panel. (This starts the slice level correction mode - paper width sensor.) Confirm “COMPLETE” is indicated on the LCD. The cover should be closed during this process. Notes: In the following cases, this adjustment should be implemented. 1) After replaceing the Control board. (not required after ROM replacement)
6	Position Correction - Paper Front Edge Sensor			①Set the continuous form (1P, 15 in. wide and 55 Kg) at the front tractor and also the ribbon cassette. ②Turn on the printer while pressing Switches 10 and 13. (This starts the paper front edge sensor position correction mode.) Confirm paper feeding/parking has been repeated 3 times and then “COMPLETE” is indicated on the LCD. Notes: In the following cases, this adjustment should be implemented. 1) After replaceing the Control board. (not required after ROM replacement)

Item No.	Items	Standard Value	Illustration	Adjustment Method
7	Auto Gap Motor Assy Backlash	J=0.1mm		①Verify the backlash is 0.1 mm between the idle gear and the adjusting cam. ②If adjustment is required, screw down the 2 screws fixing the auto gap assy, and ensure the backlash between the idle gear and the adjusting cam.
8	Bail Gear Assy Backlash	K=0.2mm		①Verify the backlash is 0.2 mm between the idle gear A and the drive gear B, and between the idle gear B and the idle gear C. ②If adjustment is required, screw down the 2 screws fixing the bail gear assy, and ensure the back lash between the idle gear A and the drive gear B, and between the idle gear B and the idle gear C.

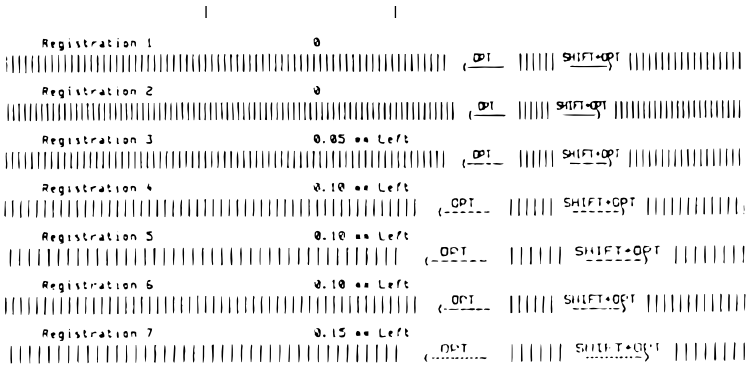
Item No.	Items	Standard Value	Illustration	Adjustment Method
9	Installing print head		  	①In installing the print head, accurately bump it to the inpinging plate on the carriage frame. Notes: The print head should be installed/ removed at 1-range position.(prevent protector deformation) ②How to tighten screws in installing the print head. a.Lightly tighten the right and left screw while pushing the print head against the carriage. b.In tightening the screws first, (note) make sure to tighten the left screw after tightening the right screw while pushing the head against the carriage. Notes 1: To prevent the float of head when tightening the screws. Notes 2: Tightening the screws while pressing the head in the direction of " ← ↑". ③Adjust the backlash of screws so that the print head can meet the center of the protector.
10	Alignment of horizontal printing			①Set a continuous paper (1P, 15 inch width, 55kg sheet) onto the printable position. ②Press [5] switch to go to the menu mode. Press [2] to display "Set-Up". Next, press [3] to display "Registration1". (The printer starts Registration1 printing.) Open the access cover to confirm that the printing is in progress and close it, and then execute the correction after pressing the ON-LINE switch.

Item No.	Items	Standard Value	Illustration	Adjustment Method
				Correct the printing alignment in each "Registration1 ....7". (Note2)(Note3)

Number	Correction dot position of reverse printing
+5	Printing position is shifted by 0.25mm to right of the reference position.
+4	Printing position is shifted by 0.20mm to right of the reference position.
+3	Printing position is shifted by 0.15mm to right of the reference position.
+2	Printing position is shifted by 0.10mm to right of the reference position.
+1	Printing position is shifted by 0.05mm to right of the reference position.
0	Reference position
-1	Printing position is shifted by 0.05mm to left of the reference position.
-2	Printing position is shifted by 0.10mm to left of the reference position.
-3	Printing position is shifted by 0.15mm to left of the reference position.
-4	Printing position is shifted by 0.20mm to left of the reference position.
-5	Printing position is shifted by 0.25mm to left of the reference position.

4

8 and 4



Note2)After printing, change items with 4 switch

Note3)The reverse printing position is shifted by 0.05mm to the reference position by pressing 4 switch or 8 and 4 switch.

④After completing the correction, press 6 switch to store the corrected values to the inside of printer. (Note4)

Note4)If the 6 switch is not pressed, the corrected values cannot be stored and the settings are returned to the previous set values.

Press 5 while holding 8 to print a menu page to check the registration. (See the left drawing)

Press the 5 switch to end the menu.

Note5) Closing the menu has the internally retained settings store to the E2P ROM.

Note6) Make sure to correct the ruled lines (1, 68, 136 characters) so that the total deviation is minimized.

5. CLEANIG AND LUBRICATION

5.1 Cleaning

[Caution]

1. Be sure to turn OFF the AC POWER switch before cleaning. Remove the AC Power cord from the printer.

2. Avoid dust inside the printer mechanism when cleaning.

3. If a lubricated part has been cleaned, be sure to apply lubricating oil to that portion after cleaning.

   (1) Cleaning time

   When the equipment time has reached six months or 300 hours, whichever comes first.

   (2) Cleaning tools

   Dry cloth (soft cloth such as gauze), vacuum cleaner.

   (3) Places to be cleaned

   Table 5.1 lists the places to be cleaned:

Table 5.1

Place to be cleaned	Cleaning procedure
Main shaft and the vicinity Paper travel surface Ribbon guide and the vicinity	Remove paper waste and wipe off stain, dust, waste. etc.

5.2 Lubrication

This printer is designed to be maintenance free and requires no lubrication during normal operation. However it is necessary to apply lubricant in case the printer is disassembled, reassembled, cleaned or parts have been changed.

(1) Cleaning time

Remarks:

1) Turn off the power before cleaning.

2) Make sure that paper dust will not fall inside of the machine.

- Cleaning period:

  6 months of operation or 300 hours of operation, whichever the earlier.

- Cleaning points:

Carriage shaft and surroundings: → Remove paper and ribbon dust.

Paper path: → Clean stains and dusts.

Paper End Sensor → Remove the dust on the Sensor.

Paper Width Sensor → Remove the dust on the Sensor.

Ribbon Jam Sensor → Remove the dust on the Sensor.

Paper Out Sensor → Remove the dust on the Sensor.

Paper Jam Sensor → Remove the dust on the Sensor.

(2) Lubricant

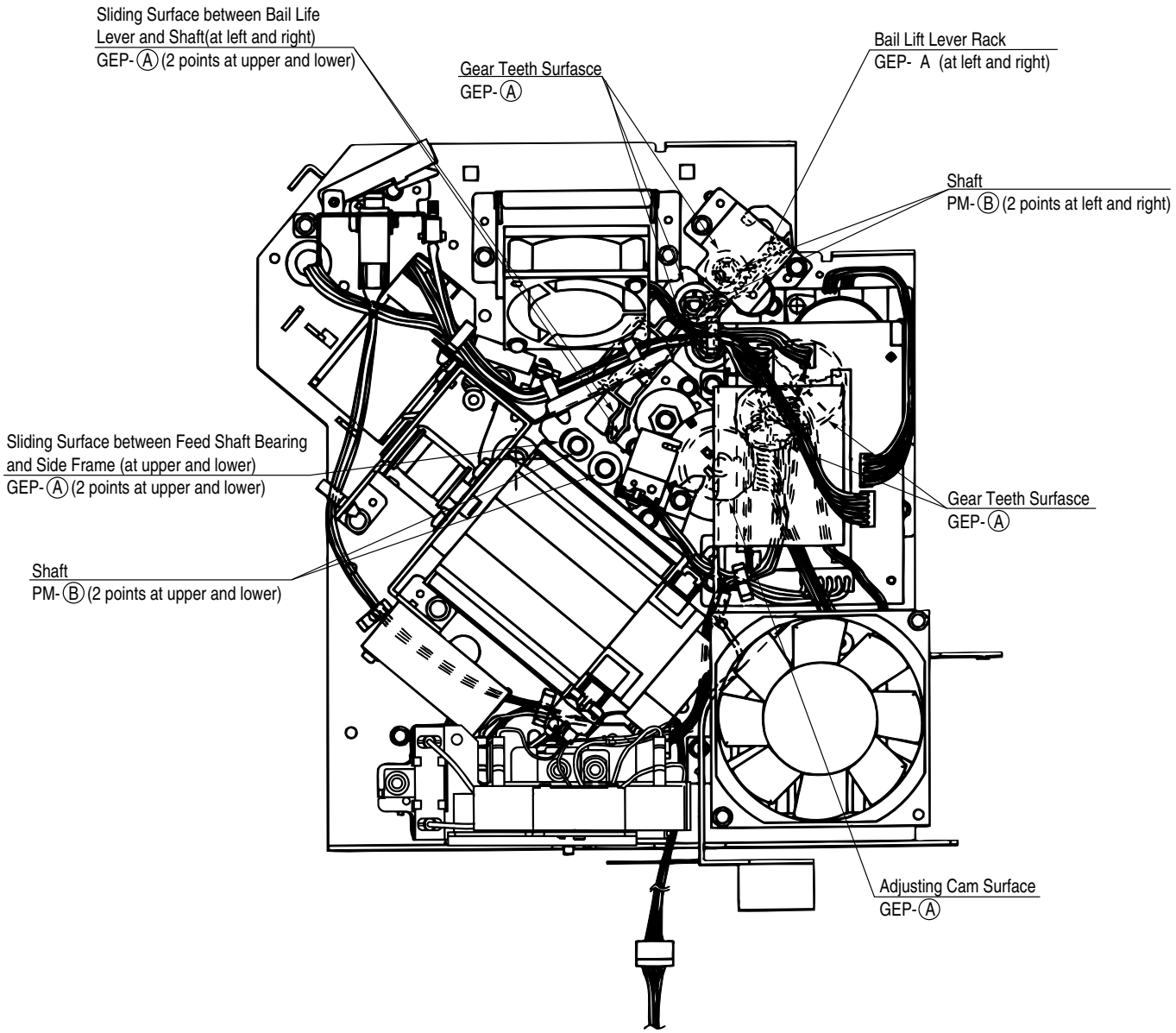
- Pan motor oil (or equivalent): PM
- Albania grease (or equivalent): GEP

(3) Amount of lubricant

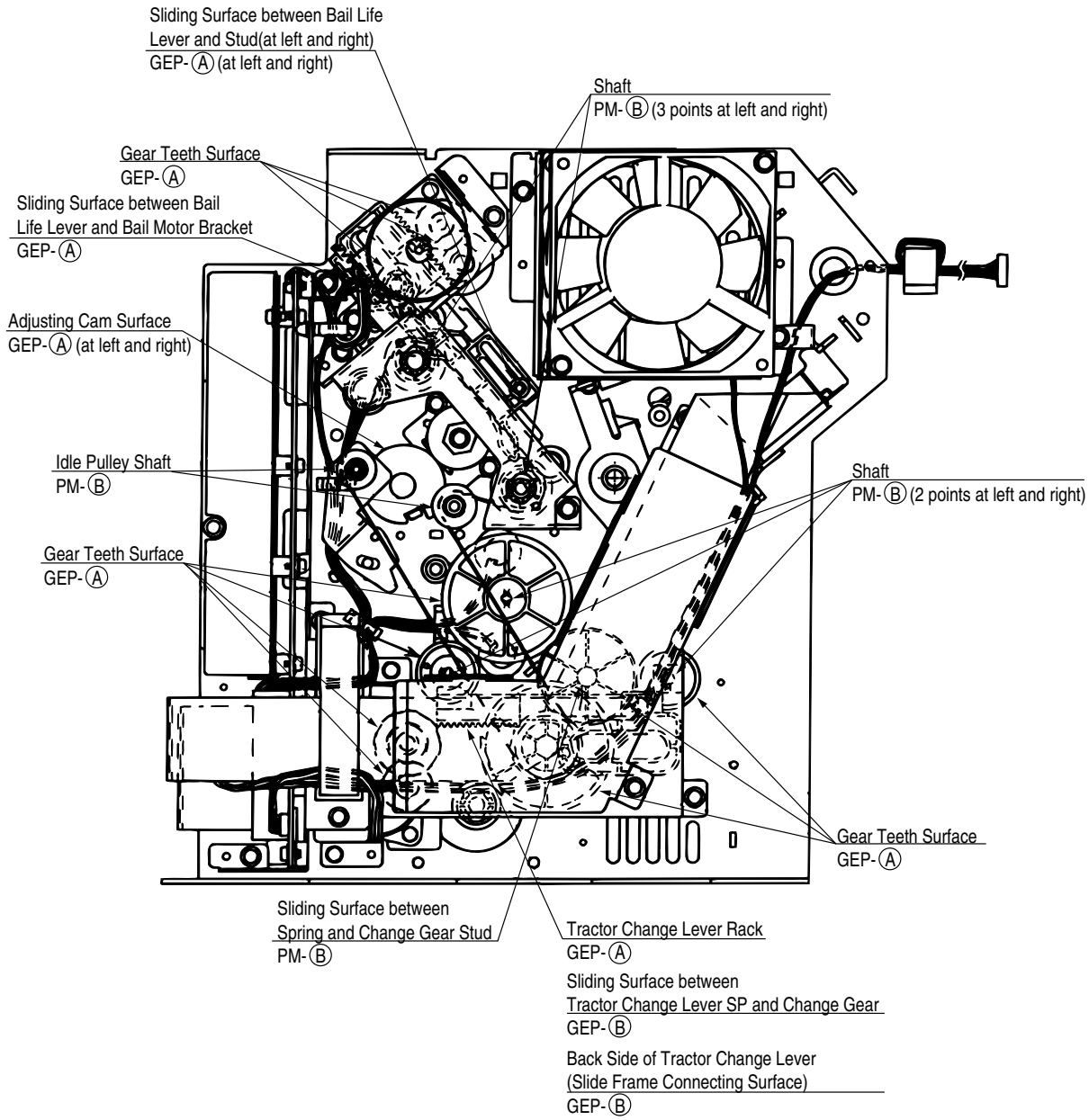
- Medium amount A : Apply three to four drops of oil, or 0.008 inch(0.2mm)thick grease.
- Small amount B : Apply one drop of oil(0.006±0.002 g)

(4) Areas to Avoid

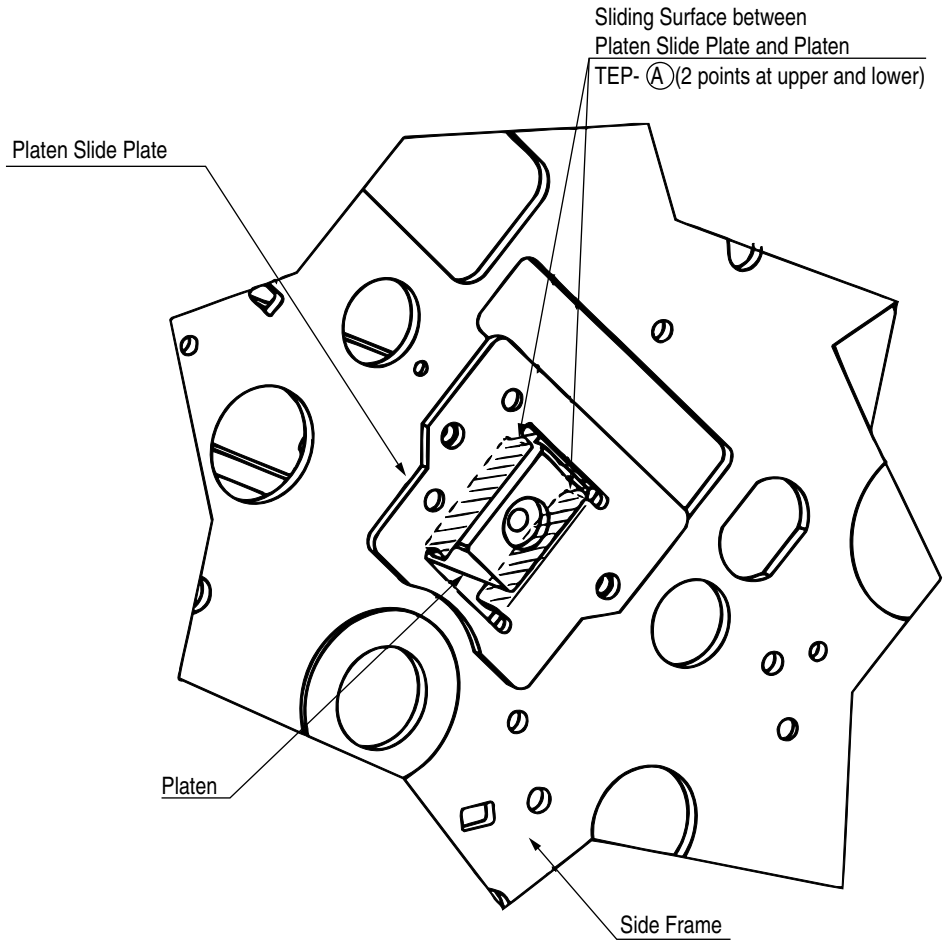
No	Do not lubricate	Reason
1	Ink ribbon	To prevent blurring of print
2	Sensor	To prevent dust adhering
3	Platen (printing face)	To prevent stained paper
4	Feed roller (rubber face and resin face)	To prevent stained paper
5	Pitch belt	To prevent rubber degradation
6	Head cable	To prevent deterioration
7	Micro switch	To prevent stained paper
8	Pin tractor surface	To prevent contacts
9	Auto gap disc	To prevent dust adhering

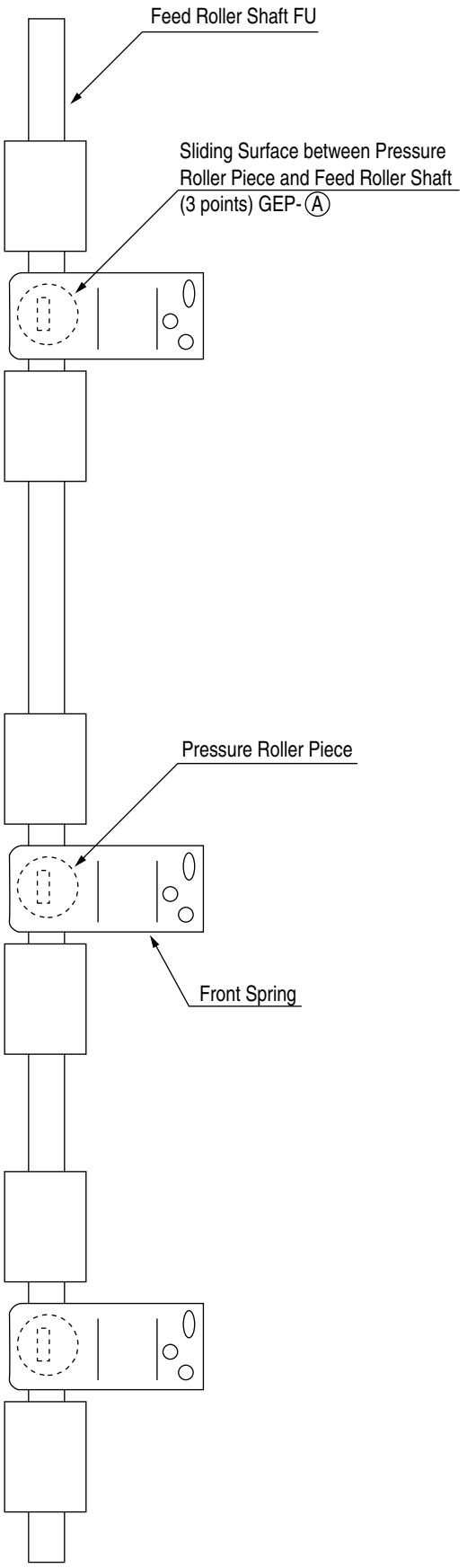

Sliding Surface between Bail Life Lever and Shaft(at left and right)
GEP-Ⓐ (2 points at upper and lower)
Gear Teeth Surfasce
GEP-Ⓐ
Bail Lift Lever Rack
GEP- A (at left and right)
Shaft
PM-Ⓑ (2 points at left and right)
Sliding Surface between Feed Shaft Bearing and Side Frame (at upper and lower)
GEP-Ⓐ (2 points at upper and lower)
Gear Teeth Surfasce
GEP-Ⓐ
Shaft
PM-Ⓑ (2 points at upper and lower)
Adjusting Cam Surface
GEP-Ⓐ

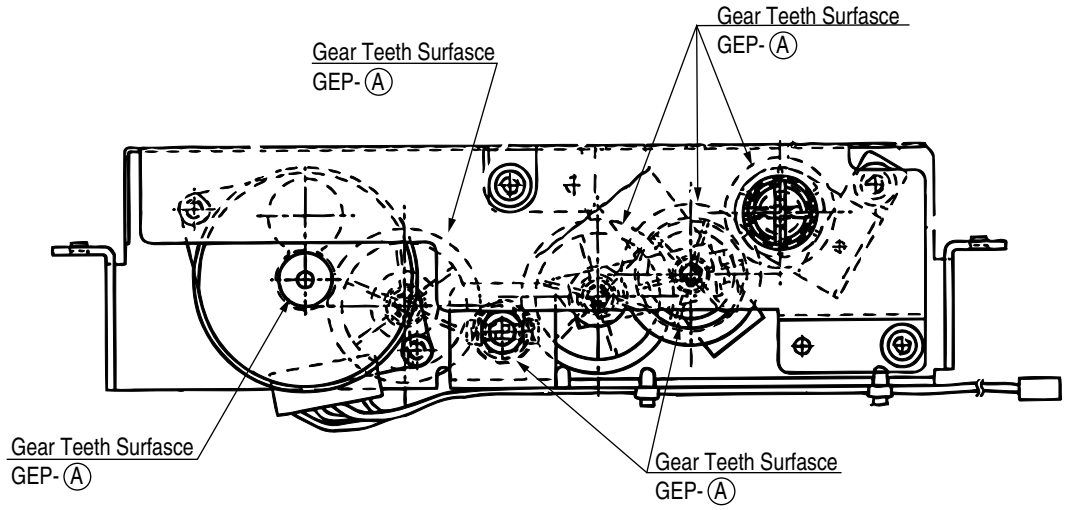
Right Side View

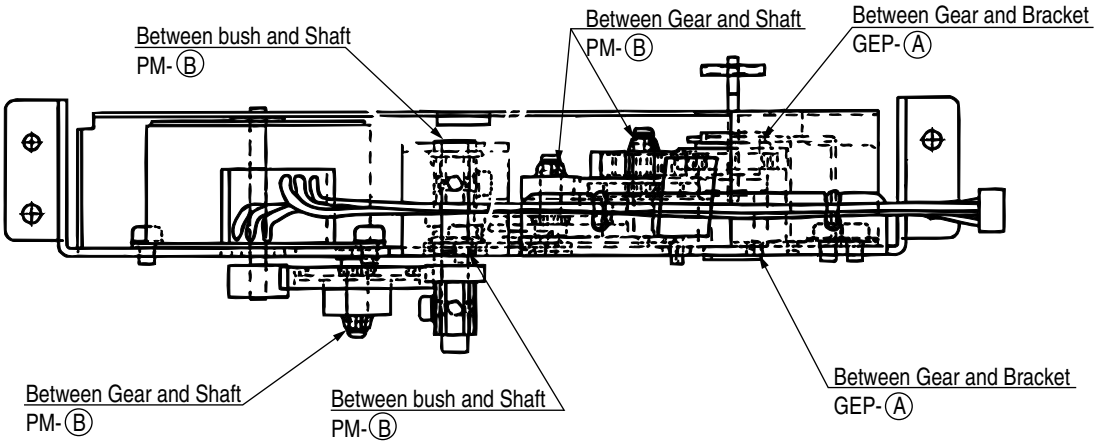

Sliding Surface between Bail Life Lever and Stud(at left and right)
GEP-Ⓐ (at left and right)
Shaft
PM-Ⓑ (3 points at left and right)
Gear Teeth Surface
GEP-Ⓐ
Sliding Surface between Bail Life Lever and Bail Motor Bracket
GEP-Ⓐ
Adjusting Cam Surface
GEP-Ⓐ (at left and right)
Idle Pulley Shaft
PM-Ⓑ
Shaft
PM-Ⓑ (2 points at left and right)
Gear Teeth Surface
GEP-Ⓐ
Gear Teeth Surface
GEP-Ⓐ
Sliding Surface between Spring and Change Gear Stud
PM-Ⓑ
Tractor Change Lever Rack
GEP-Ⓐ
Sliding Surface between Tractor Change Lever SP and Change Gear
GEP-Ⓑ
Back Side of Tractor Change Lever (Slide Frame Connecting Surface)
GEP-Ⓑ

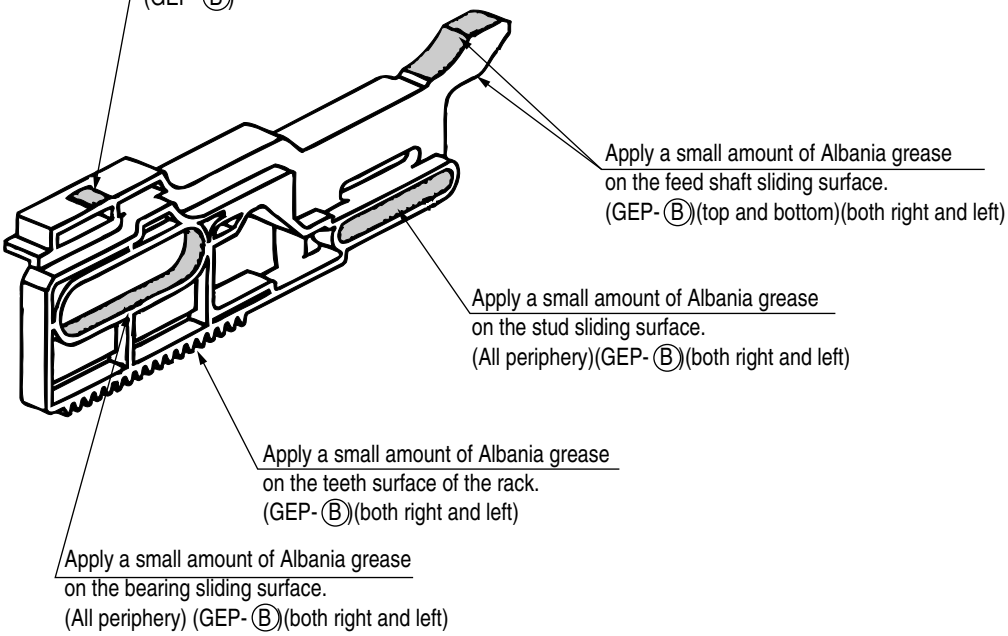
Left Side View


Sliding Surface between
Platen Slide Plate and Platen
TEP- Ⓐ(2 points at upper and lower)
Platen Slide Plate
Platen
Side Frame

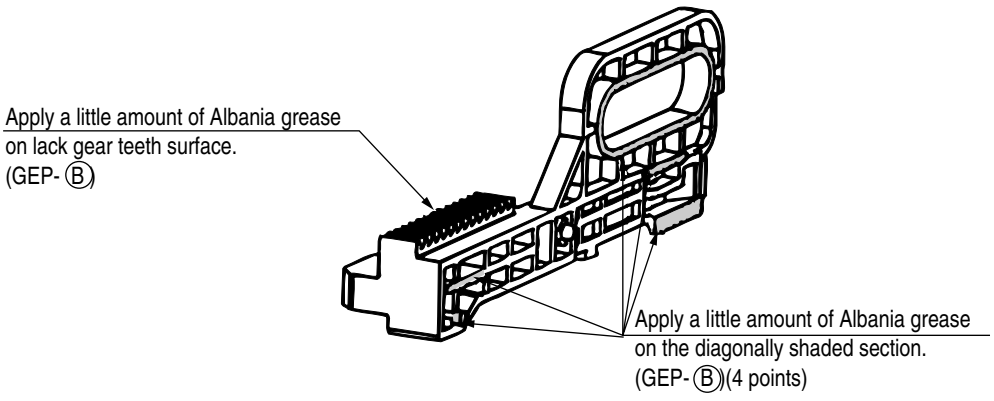

Feed Roller Shaft FU
Sliding Surface between Pressure Roller Piece and Feed Roller Shaft (3 points) GEP-Ⓐ
Pressure Roller Piece
Front Spring


Gear Teeth Surfasce
GEP-Ⓐ
Gear Teeth Surfasce
GEP-Ⓐ
Gear Teeth Surfasce
GEP-Ⓐ
Gear Teeth Surfasce
GEP-Ⓐ

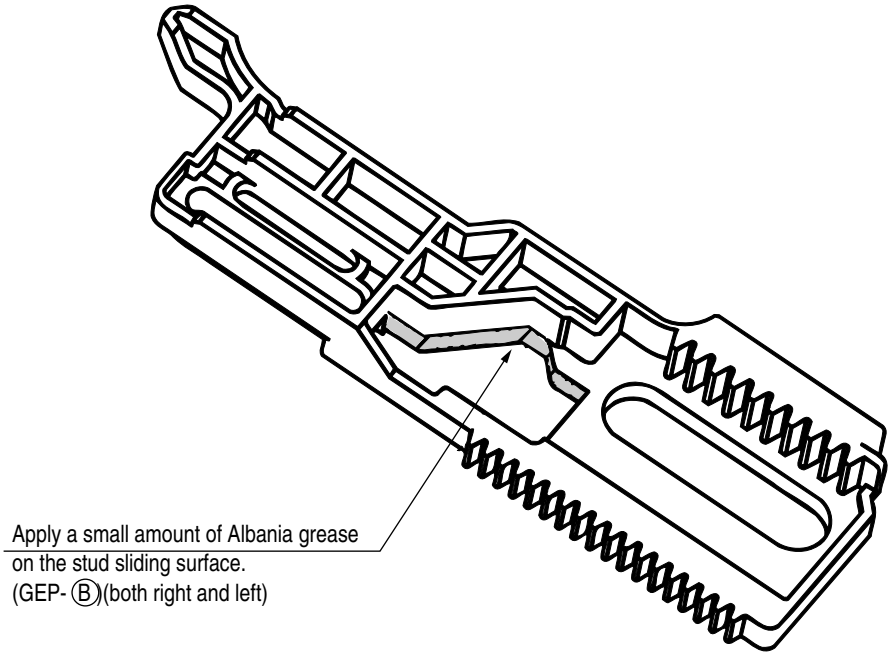

Between bush and Shaft
PM-Ⓑ
Between Gear and Shaft
PM-Ⓑ
Between Gear and Bracket
GEP-Ⓐ
Between Gear and Shaft
PM-Ⓑ
Between bush and Shaft
PM-Ⓑ
Between Gear and Bracket
GEP-Ⓐ


Apply a small amount of Albania grease
on the diagonally shaded section.
(GEP-Ⓑ)
Apply a small amount of Albania grease
on the feed shaft sliding surface.
(GEP-Ⓑ)(top and bottom)(both right and left)
Apply a small amount of Albania grease
on the stud sliding surface.
(All periphery)(GEP-Ⓑ)(both right and left)
Apply a small amount of Albania grease
on the teeth surface of the rack.
(GEP-Ⓑ)(both right and left)
Apply a small amount of Albania grease
on the bearing sliding surface.
(All periphery) (GEP-Ⓑ)(both right and left)

Bail lift lever oblique view


Apply a little amount of Albania grease
on lack gear teeth surface.
(GEP-Ⓑ)
Apply a little amount of Albania grease
on the diagonally shaded section.
(GEP-Ⓑ)(4 points)

Tractor change lever Assy oblique view


Apply a small amount of Albania grease
on the stud sliding surface.
(GEP- Ⓑ)(both right and left)

6. TROUBLESHOOTING AND REPAIR

6.1 Items to Check Before Repair

(1) Check the inspection items specified in the instruction manual.

(2) Find out as many details of the trouble as possible from the customer.

(3) Inspect in the conditions as close as possible to those at the time the trouble occured.

(4) Proceed with the repair as follows:

Check the trouble status according to Table 6.1 for the details of the troble. Then, locate the trouble position according to the detailed flowchart.

(5) Carry out a thorough test after the repair to check for correct functioning.

6.2 Troubleshooting Table

Table 6.1

Status	Details	Flowchart item No.
Trouble upon power on	• Power is not supplied.	①
	• The printer can be powered on, but stays still without displaying anything on the LCD.	②
	• The printer cannot normally complete the initializing operation.	③
Trouble during printing	• A function is not started when the switch pressed.	④
	• Ribbon feed trouble. (Alarm lamp flashes, LCD reads “ERROR, RIBBON JAM”)	⑤
	• Line feed trouble.	⑥
	• Character or dot lack	⑦
	• Thin printing	⑧
	• The printer can normally operate, but not start printing.	⑨

6.3 Lamp and LCD Display

(1) Printer mode display

Table 6.2

Printer mode		LED CONDITION ALARM	LED CONDITION SELECT	LCD	Contents	Trouble Shooting	Remarks
Operation mode	ON LINE	OFF	ON	ON-LINE	Indicates that the printer is ready for receiving.	———	The messages in □ of the display varies depending on printer settings and operational conditions.
	HEX DUMP			HEXDUMP	Indicates that the printer is in the hex dump mode.	———	The messages in □ of the display varies depending on printer settings and operational conditions.
	SELF TEST		OFF	SELF TEST	Indicates that the printer is in the self test mode.	———	The messages in □ of the display varies depending on the type of tests.
	MENU				Indicates that the printer is in the menu mode.	———	Refer to the Maintenance Manual for LCD messages.
Operator alarm	FRONT PAPER END	ON	OFF	OFF-LINE FRONT PAPER END	•Paper is not set on the front tractor.	Set a sheet of paper on the front tractor. (If the problem cannot be solved, then go to Ⓠ.)	The □ area of the display shows a head gap value selected.
	REAR PAPER END			OFF-LINE REAR PAPER END	•Paper runs out in the front path. •Paper is not set on the rear tractor.	Set a sheet of paper on the rear tractor. (If the problem cannot be solved, then go to Ⓠ.)	The □ area of the display shows a head gap value selected.
	EJECT JAM			OFF-LINE EJECT JAM	•Paper runs out in the rear path. Paper cannot be ejected.	Properly reload the paper on the tractor.	
	LOAD JAM			OFF-LINE LOAD JAM	Paper cannot be input.	Properly reload the paper on the tractor.	
	PARK JAM			OFF-LINE PARK JAM	Paper cannot be parked.	Properly reload the paper on the tractor.	
	FEED JAM			OFF-LINE FEED JAM	Paper cannot be carried.	Properly reload the paper on the tractor. (If the problem cannot be solved, then go to Ⓟ.)	
	PAPER JAM			OFF-LINE PAPER JAM	The upper paper end and tractor switch have detected paper, but the lower paper end sensor does not detect it.	Remove any torn paper. (If the problem cannot be solved, then go to Ⓡ.)	
	REBBON JAM			OFF-LINE RIBBON JAM	Ink ribbon cannot be fed.	•Properly reload the ribbon cartridge. •Replace the ink ribbon. (If the problem cannot be solved, then go to ⑤.)	
	PATH CHANGE JAM			OFF-LINE PATH CHANGE JAM	Paper jam caused by a path change.	Change paths after removing the paper.	
	PAPER RELEASE	OFF		OFF-LINE PATH RELEASE	In a state of waiting for paper feed (print data is left)	Feeds paper	

Printer mode		LED CONDITION		LCD	Contents	Trouble Shooting	Remarks
		ALARM	SELECT				
Operator alarm	COVER OPEN	ON	OFF	OFF-LINE COVER OPEN	The access cover is open.	Close the access cover. (If the problem cannot be solved, then go to Ⓒ.)	
	DATA REMAIN			OFF-LINE DATA REMAIN	A status where the printer alarms cover open with data remained inside the printer (the space is in motion) and then the cover is closed.	———	
Fault alarm					For details see paragraph (2) alarm displqy.	———	
Thermal alarm	HEAD Thermal	OFF	ON	WAITING HEAD THERMAL	A thermal alarm of print head. Printer is changed to one-way printing mode.	•It is recovered dutomatically. •1)Replace Print Head. 2)Replace Driver Board.	
	SP Thermal			WAITING SP THERMAL	A thermal alarm of space motor. Line spacing wait command interrupts the process.	•It is recovered dutomatically. •Replace Control Board.	

(2) Fault alarm display

When the printer detects any of the various alarm states, the information is displayed as shown below on the operation panel. The alarm is specified by ALARM lamp and LCD Display. (See Table 6.3 for details.)

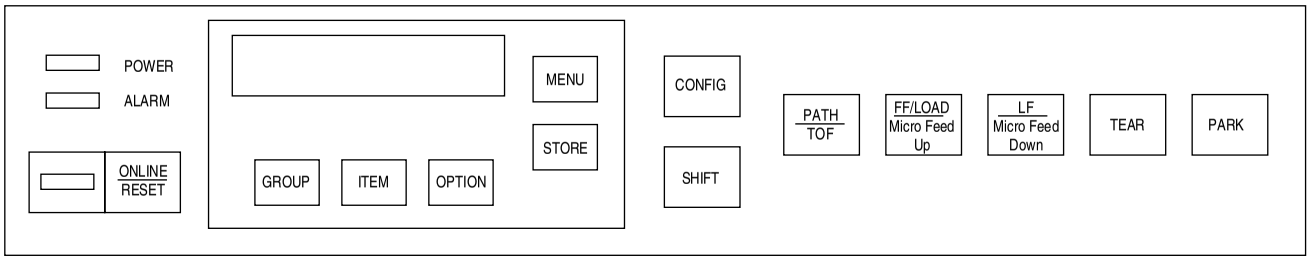


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Table 6.3 Fault alarm (1/3)

Error Category		LCD	Contents	Trouble Shooting
RAM ERROR	D-RAM ERROR	ERROR D-RAM	D-RAM cannot be read/written.	Replace the Control Board.
	S-RAM ERROR	ERROR S-RAM	S-RAM cannot be read/written.	Replace the Control Board.
ROM ERROR	PG-ROM ERROR	ERROR PROGRAM-ROM	The checksum of PG-ROM is incorrect.	1) Replace the PG-ROM. 2) Replace the Control Board.
	CG-ROM ERROR	ERROR CG-ROM	Data cannot be read from the CG-ROM.	1) Replace the CG-ROM. 2) Replace the Control Board.
	EEP-ROM ERROR	ERROR EEPROM	EEP-ROM cannot be read/written.	1) Replace the EEP-ROM. 2) Replace the Control Board.
PROGRAM ERROR	WATCHDOG TIMER ERROR	ERROR WDT	Response from a program has not been returned for a specified time.	Replace the Control Board.
	INVALID INTERRUPT ERROR	ERROR INVALID IPT	In spite of prohibited interruption, an interrupt is accepted.	Replace the Control Board.
ENGINE ERROR	SPACING ERROR	ERROR SPACING	The carriage cannot operate normally.	1) Check the installation of interlock switches and interlock levers. 2) Replace the SP motor. 3) Check the connection of cables. 4) Replace the Control Board.
	HOMING ERROR	ERROR HOMING	The carriage shows a malfunction or cannot move at all.	
	CENTERING ERROR	ERROR CENTERING	The carriage cannot operate normally.	
	POWER SUPPLY COOLING FAN ERROR	ERROR POWER-FAN	The power supply cooling FAN cannot run.	1) Replace the power supply cooling FAN. 2) Replace the Control Board.
	HEAD COOLING FAN1 ERROR	ERROR HEAD 1 FAN	The head cooling FAN1 cannot run.	1) Replace the head cooling FAN1. 2) Replace the Control Board.
	HEAD COOLING FAN2 ERROR	ERROR HEAD 2 FAN	The head cooling FAN2 cannot run.	1) Replace the head cooling FAN2. 2) Replace the Control Board.
	SPACE MOTOR COOLING FAN ERROR	ERROR SPACE FAN	The space motor cooling FAN cannot run.	1) Replace the space motor cooling FAN or PG cooling FAN. 2) Replace the Control Board.

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Table 6.3 Fault alarm (2/3)

Error Category		LCD	Contents	Trouble Shooting
ENGINE ERROR	FUSE ERROR	ERROR FUSE	F1 or F2 is burnt on the Control Board, or +44 V is not supplied from the power supply unit.	1) Replace the fuse. 2) Replace the power unit. 3) Replace the Control Board. 4) Replace the Driver Board.
	HEAD THERMISTER ERROR	ERROR HEAD THERMISTER	The head thermister is damaged.	1) Replace the Printhead. 2) Replace the Driver Board.
	AUTO GAP ERROR	ERROR AUTO GAP	The head gap cannot be adjusted automatically.	1) Adjust the head gap. 2) Replace the Driver Board. 3) Replace the Control Board.
	PATH CHANGE ERROR	ERROR PATH CHNGE	Switching between front/rear path cannot be done.	1) Replace the Driver Board. 2) Replace the Control Board.
	BAIL MOTOR ERROR	ERROR BAIL	The bail assy cannot work.	Replace the Control Board.
	RIBBON ERROR	ERROR RIBBON	The ink ribbon cannot be feed.	1) Replace the ribbon cartridge. 2) Replace the Control Board.
	MAIN LSI ERROR	ERROR MAIN LSI	The main LSI does not work normally.	Replace the Control Board.
OPERATION PANEL ERROR	LCD TIMEOUT ERROR	ERROR LCDTIME OUT	No response is returned from the LCD unit.	Replace the LCD unit.
FLASH MEMORY ERROR	FLASH MEMORY CHIP ERROR	ERROR FLASH CHIP	The flash memory is damaged.	Replace the Control Board
	FLASH MEMORY HASH ERROR	ERROR FLASH HASH	The checksum of memory flash is incorrect.	1) Reload the program. 2) Replace the Control Board.
	FLASH MEMORY POLING ERROR	ERROR FLASH MEMORY	No response is returned from the flush memory.	Replace the Control Board.
	FLASH MEMORY UNLOAD ERROR	ERROR FLASH UNLOAD	No program is loaded to the flash memory.	1) Reload the program. 2) Replace the Control Board.
	FLASH MEMORY INVALID COMMAND RECEIVING	ERROR FLASH COMMAND	Flash memory invalid command is sent from a host.	Let the host stop sending the flash memory invalid command.

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Table 6.3 Fault alarm (3/3)

Error Category		LCD	Contents	Trouble Shooting
OPTION ERROR	OPTION CARD ROM ERROR	ERROR OPT CARD ROM	A checksum error of the ROM on the serial I/F Board or Attachment Board.	Replace the serial I/F Board or Attachment Board.
	OPTION CARD RAM ERROR	ERROR OPT CARD RAM	A write/read error of the RAM on the serial I/F Board or Attachment Board.	Replace the serial I/F Board or Attachment Board.
	OPTION CARD CONNECT ERROR	ERROR OPT CARD CONNECT	The check on the connection with the serial I/F Board or Attachment Board resulted in NG.	Replace the Control Board or serial I/F Board or Attachment Board.

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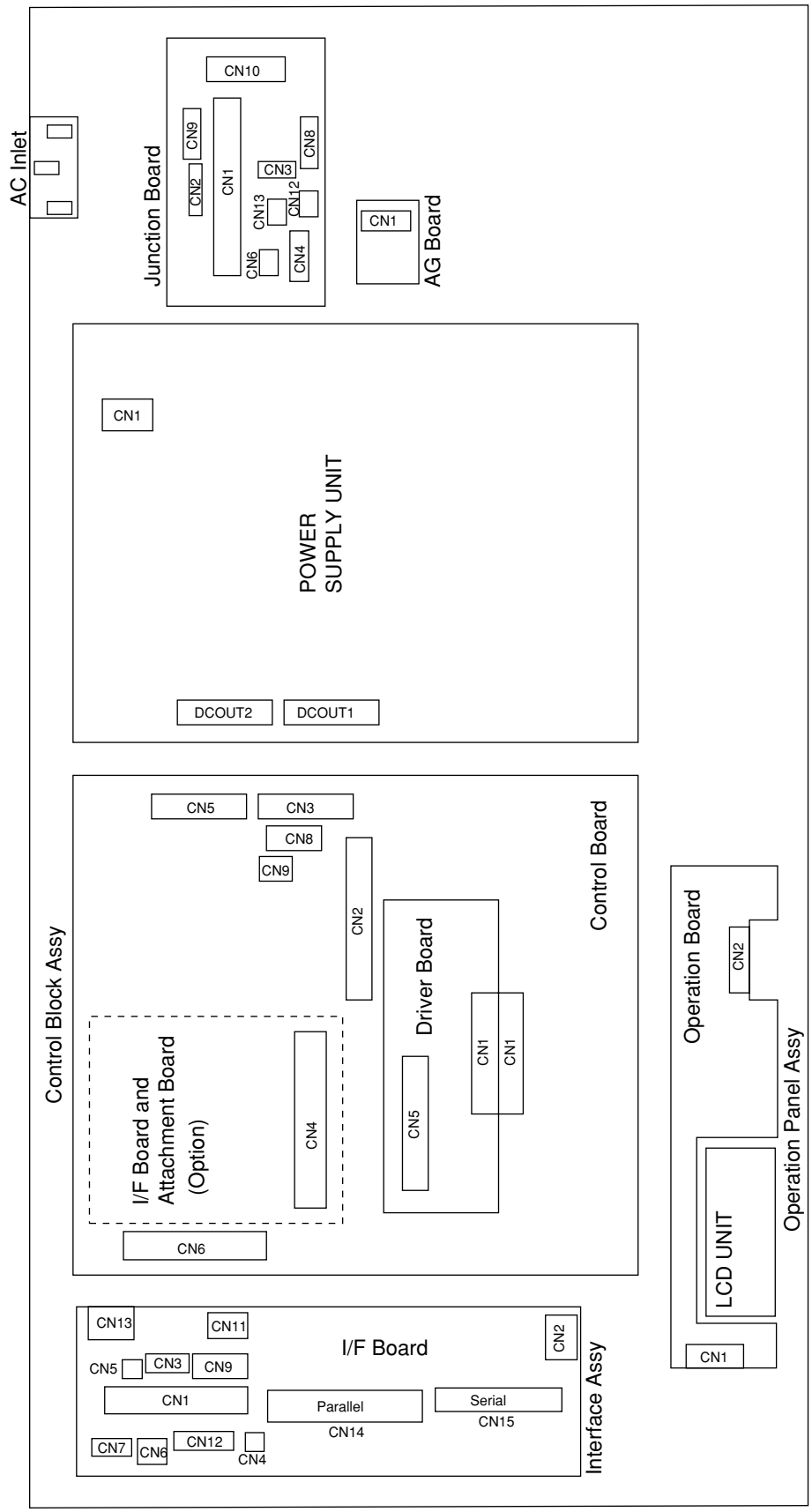
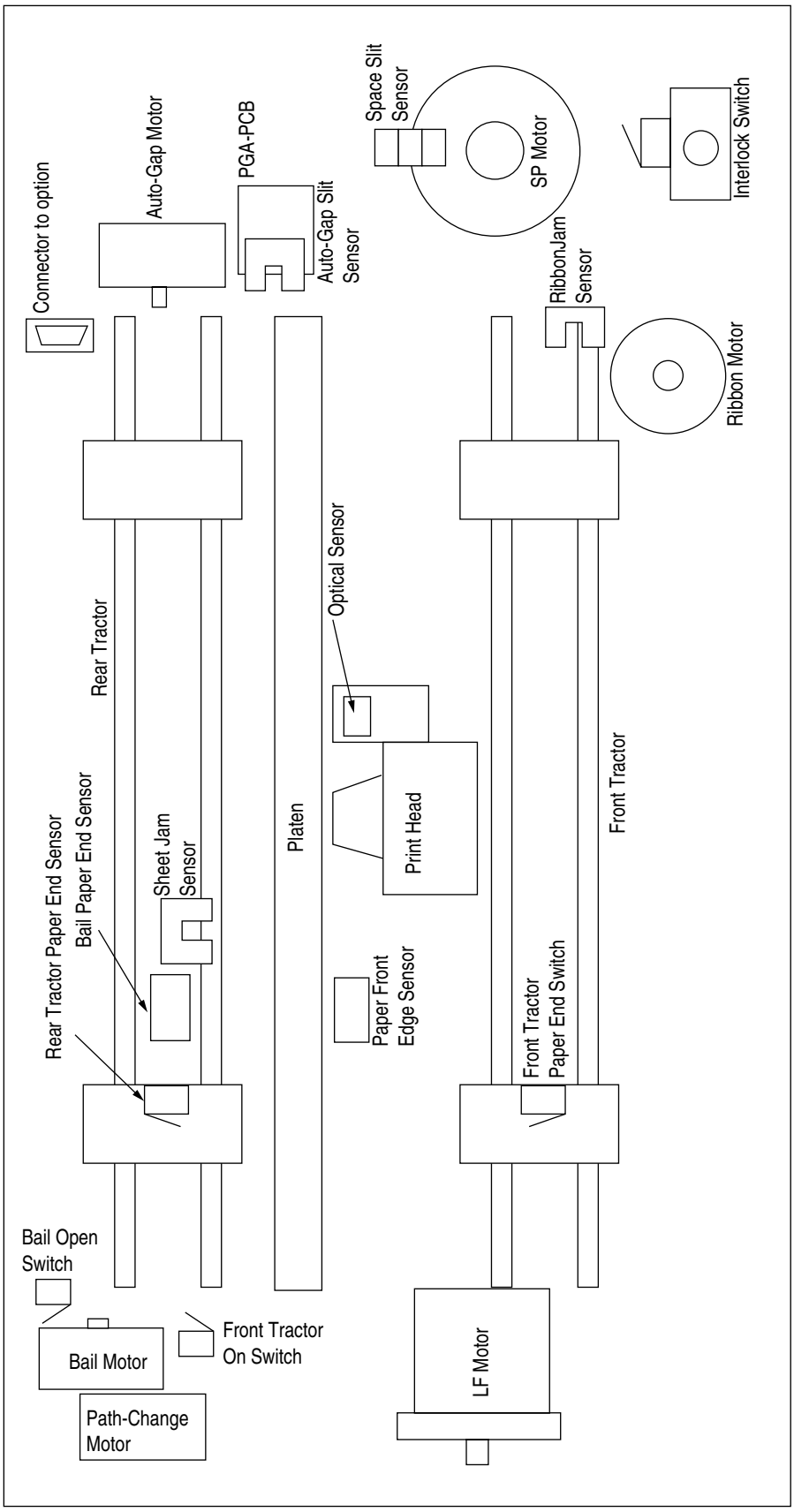
6.4 Part Layout

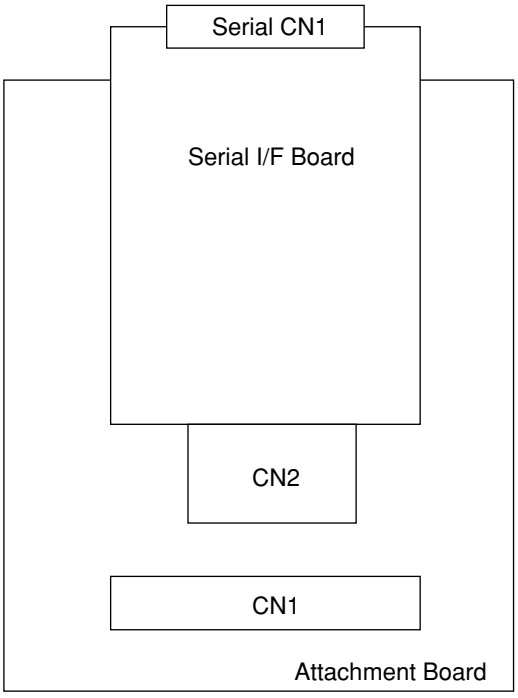
(1) PCB



(2) Other


Space Slit Sensor
SP Motor
Interlock Switch
Auto-Gap Motor
PGA-PCB
Auto-Gap Slit Sensor
Connector to option
RibbonJam Sensor
Ribbon Motor
Optical Sensor
Rear Tractor
Platen
Print Head
Front Tractor
Rear Tractor Paper End Sensor
Bail Paper End Sensor
Sheet Jam Sensor
Paper Front Edge Sensor
Front Tractor Paper End Switch
Bail Open Switch
Front Tractor On Switch
Bail Motor
Path-Change Motor
LF Motor

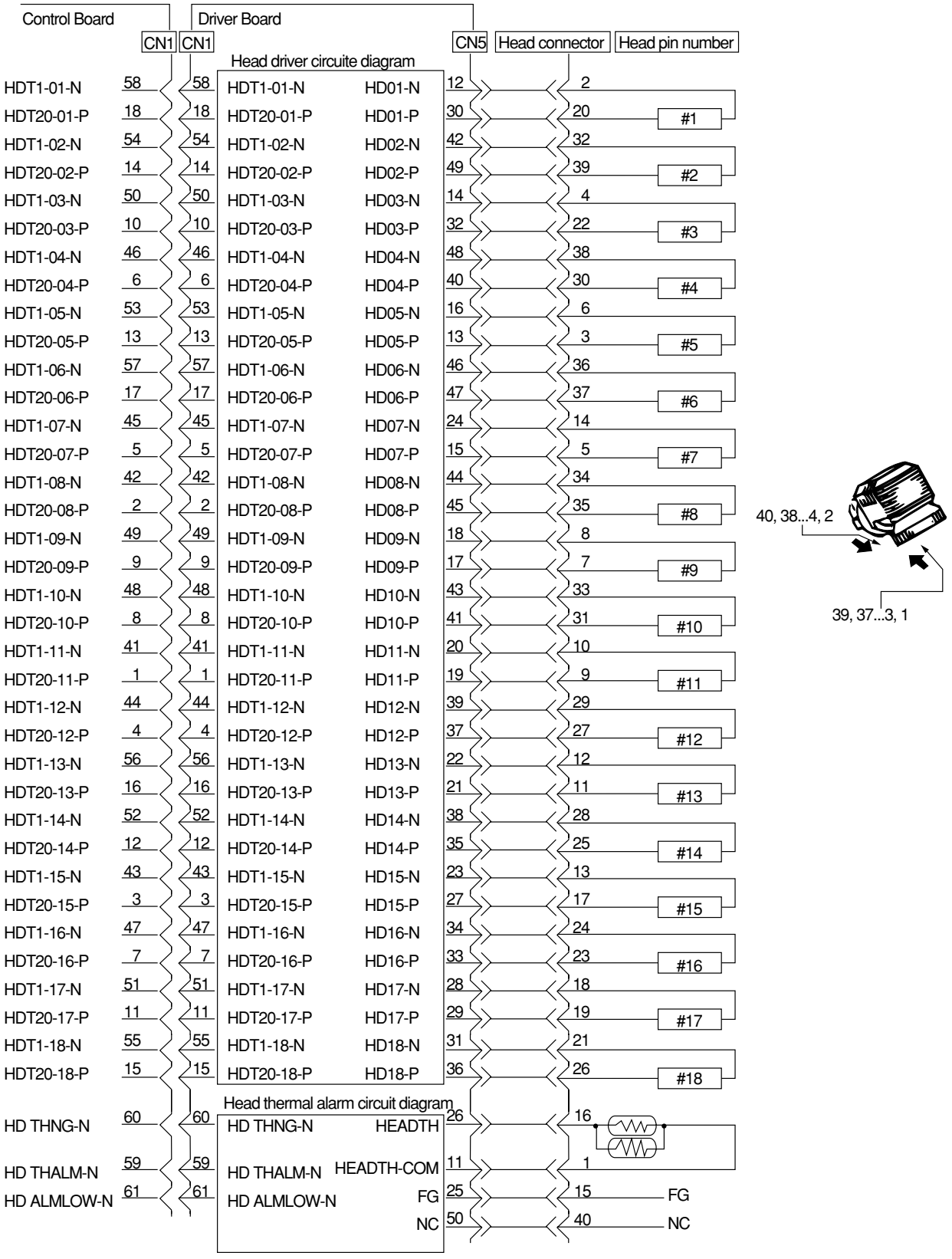
(3) Serial I/F Board (option)



6.5 Connection

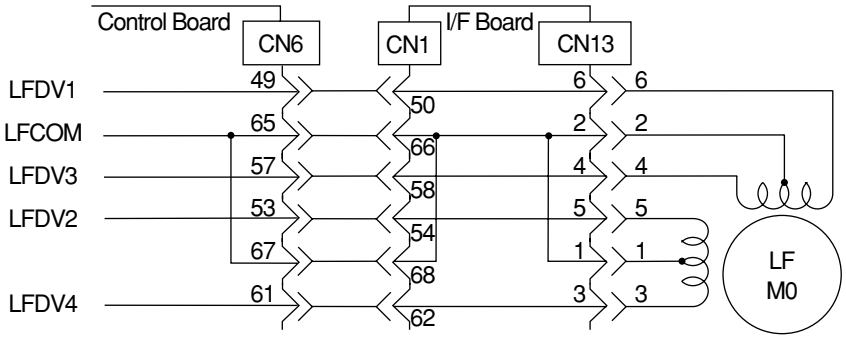
(1) Printhead

Resistance of each coil should be about 5.8Ω



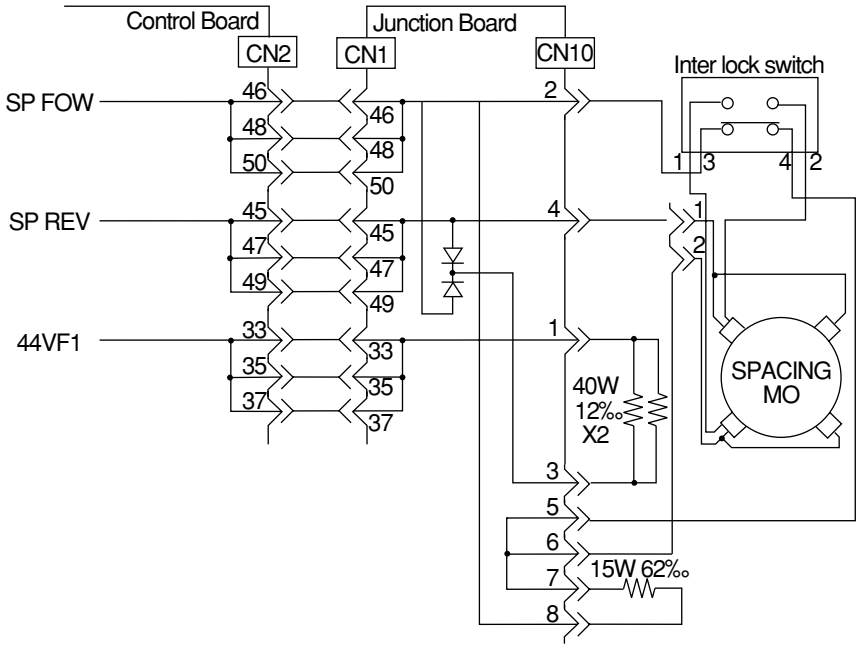
(2) Line feed motor

Resistance of each coil should be about 4.2Ω



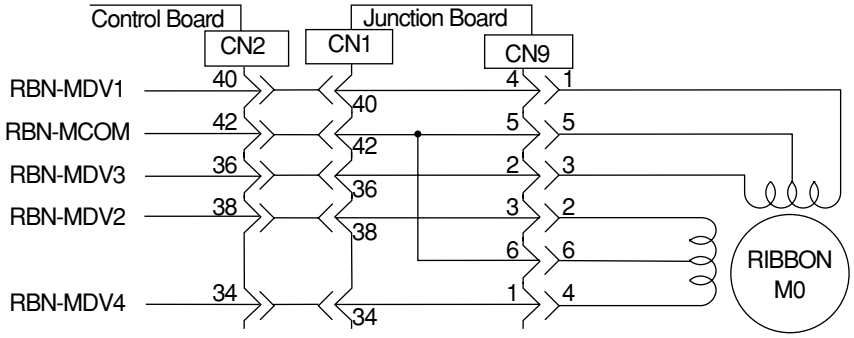
(3) Space motor

Resistance of motor should be about 1.08Ω



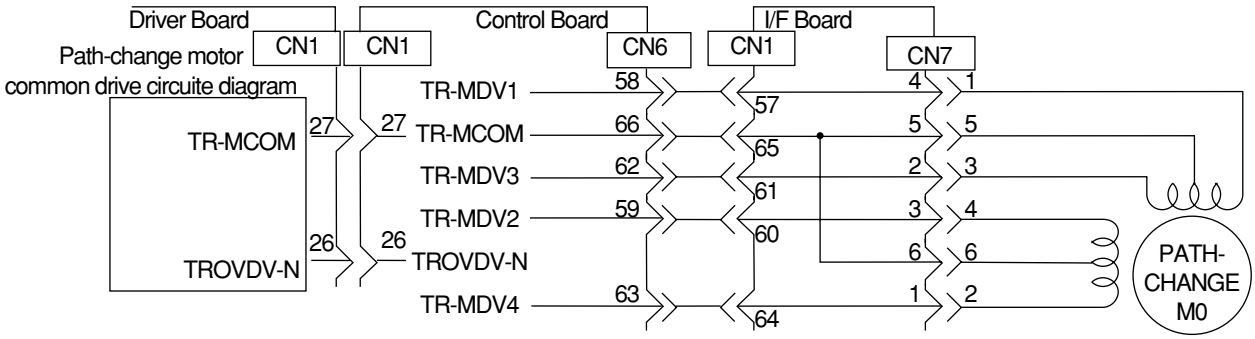
(4) Ribbon motor

Resistance of each coil should be about 155Ω



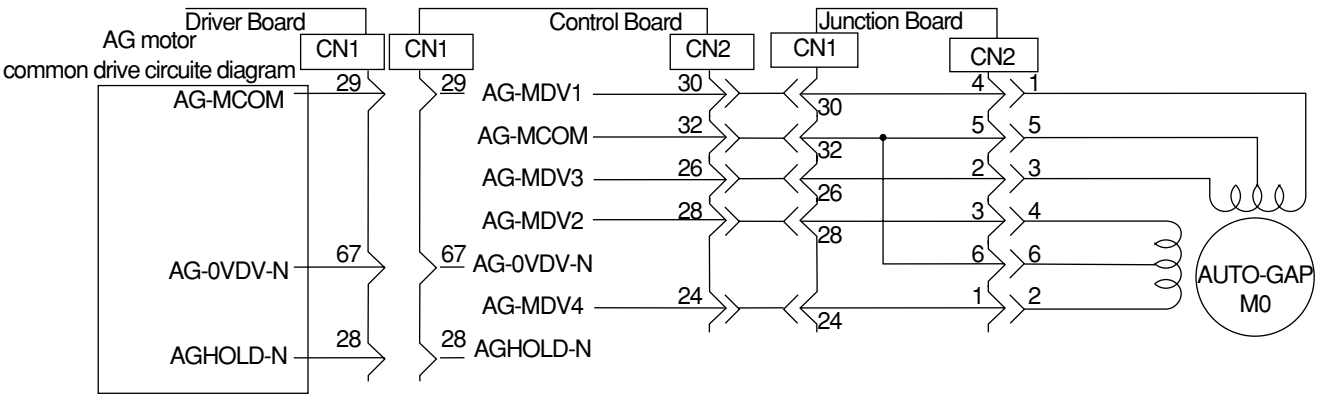
(5) Path-change motor

Resistance of each coil should be about 90Ω



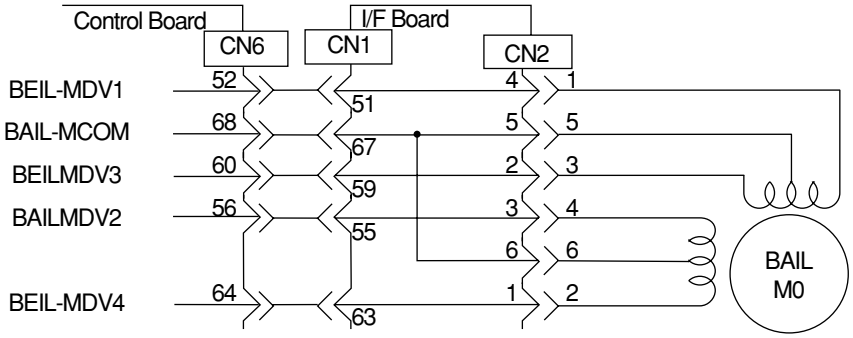
(6) AG motor

Resistance of each coil should be about 90Ω

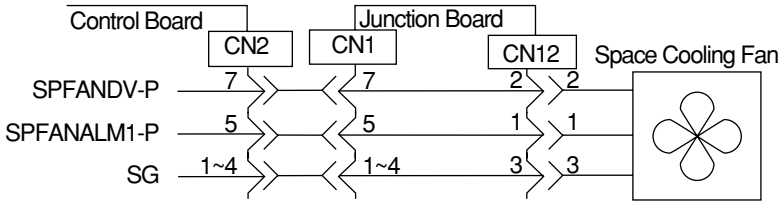


(7) Bail motor

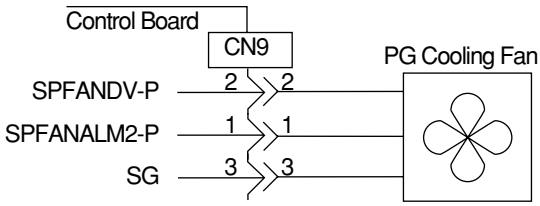
Resistance of each coil should be about 90Ω



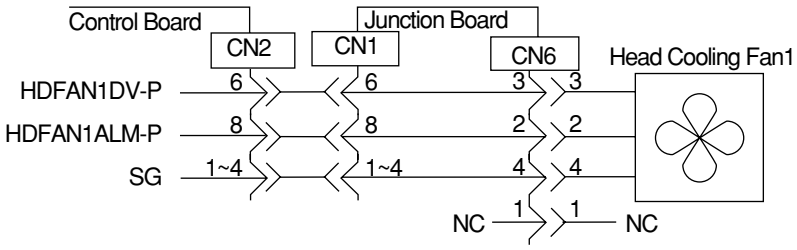
(8) Space Cooling Fan



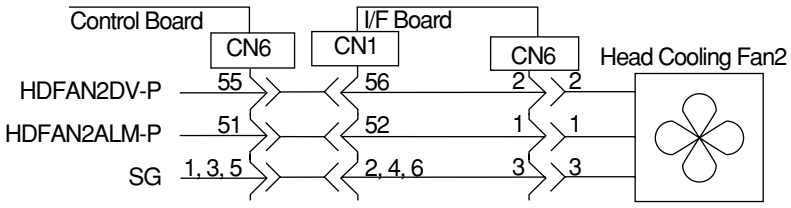
(9) PG Cooling Fan



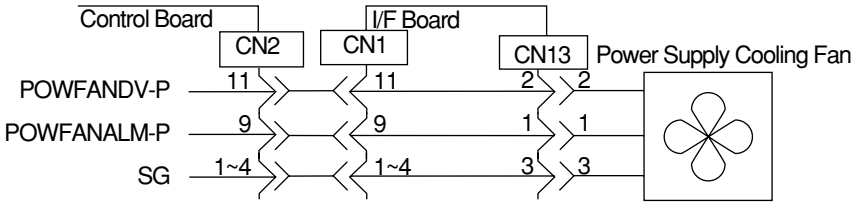
(10) Head Cooling Fan1



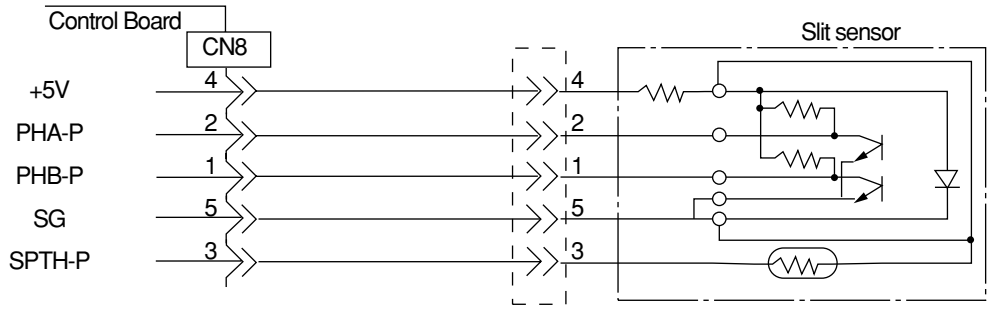
(11) Head Cooling Fan2



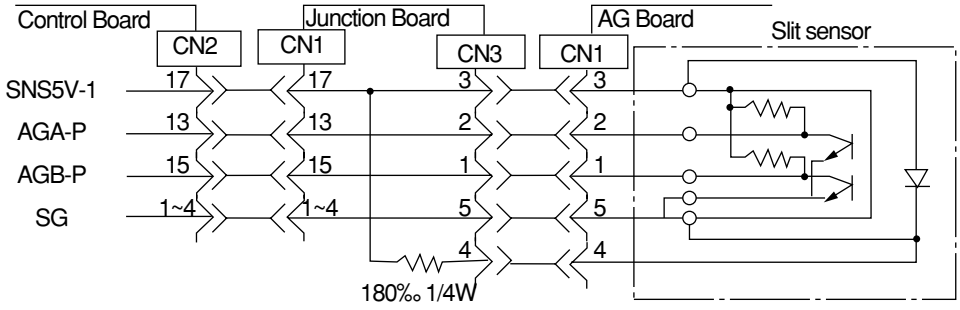
(12) Power Supply Cooling Fan



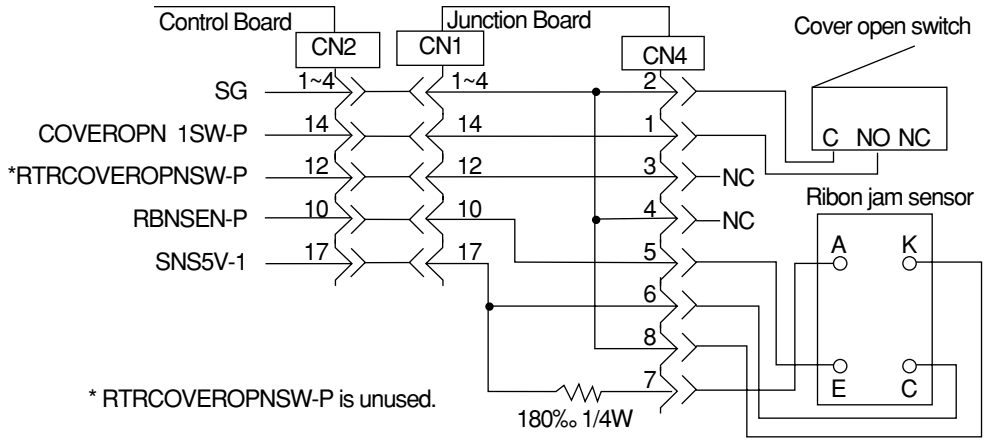
(13) space slit sensor



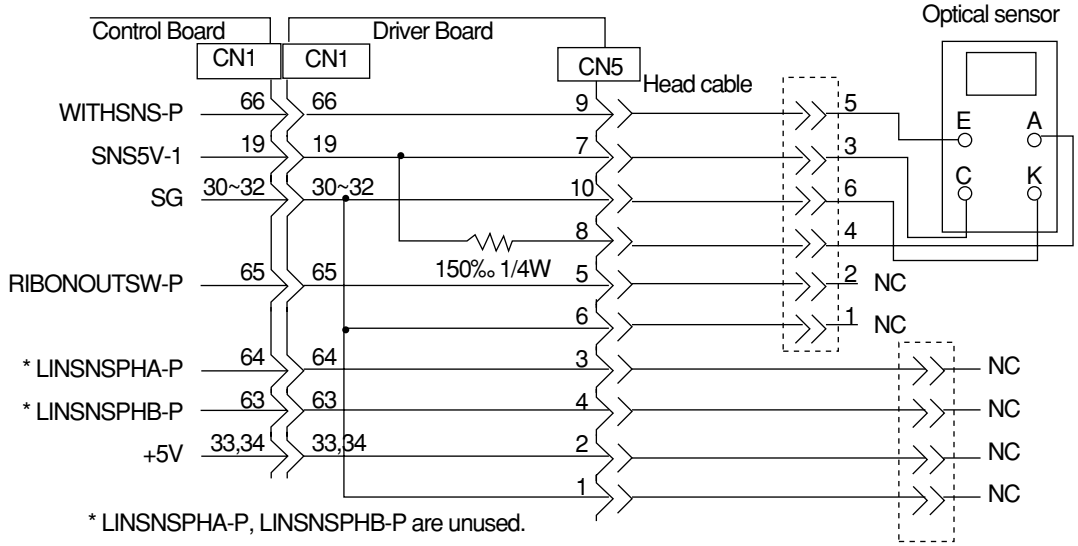
(14) AG slit sensor



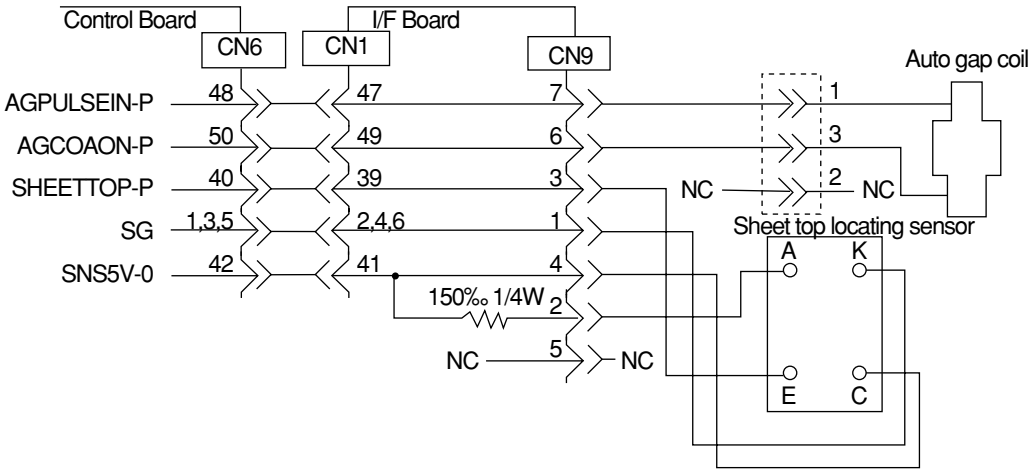
(15) Cover Open Switch/ Ribbon Jam Sensor



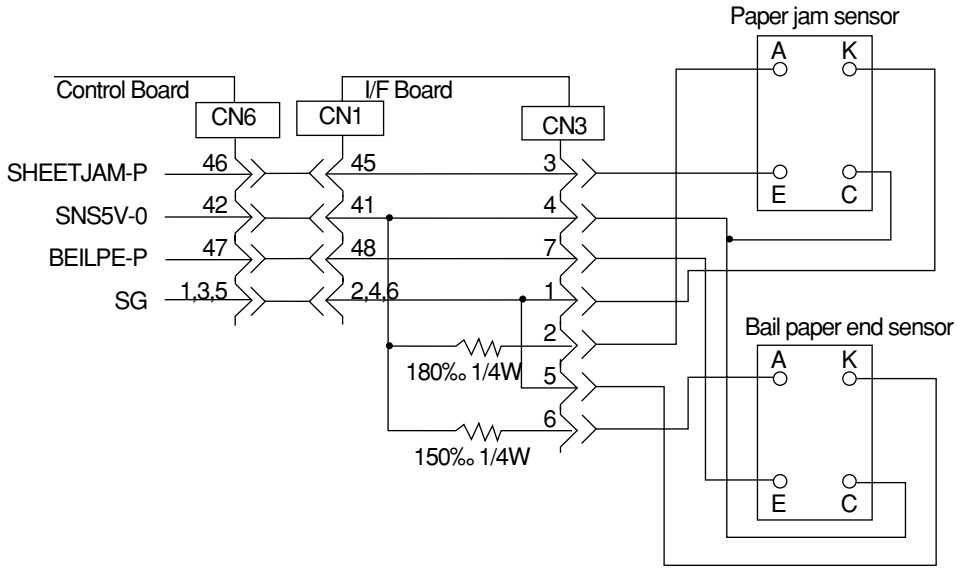
(16) Optical Sensor



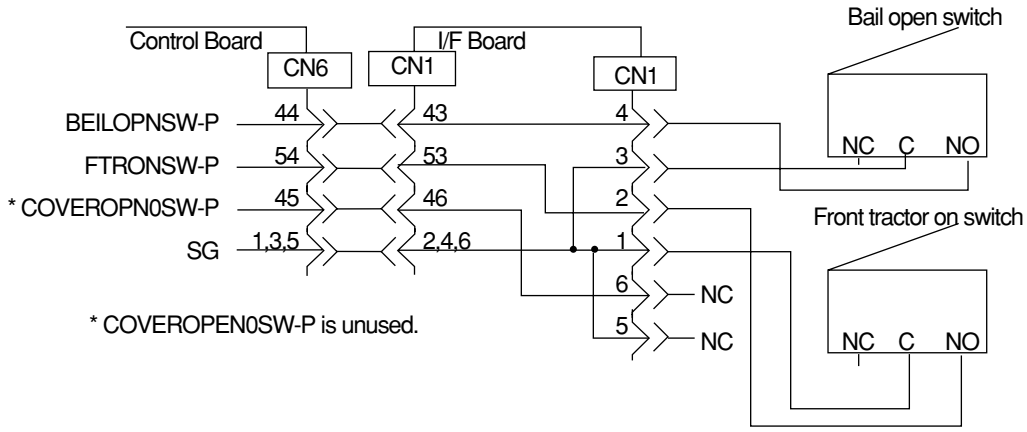
(17) Sheet Top Locating Sensor/ AG Core



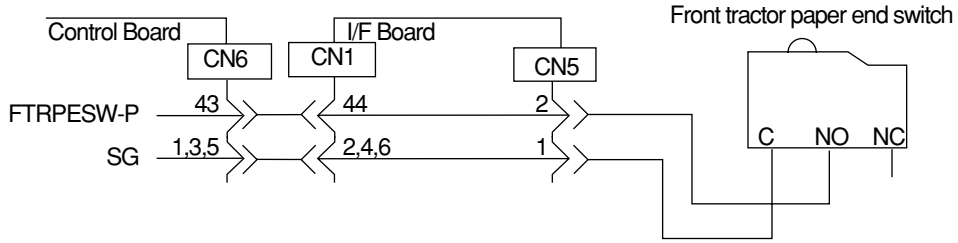
(18) Paper Jam Sensor/ Bail Paper End Sensor



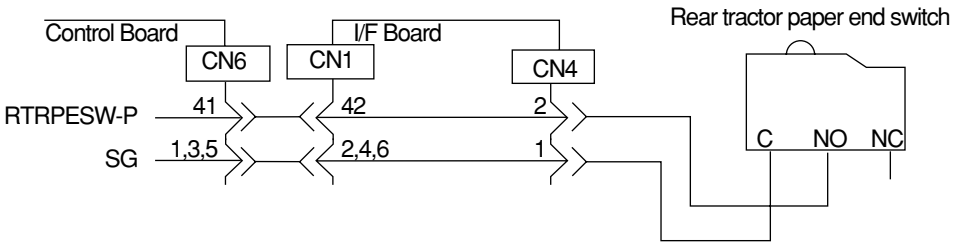
(19) Bail Open Switch/ Front Tractor On Switch



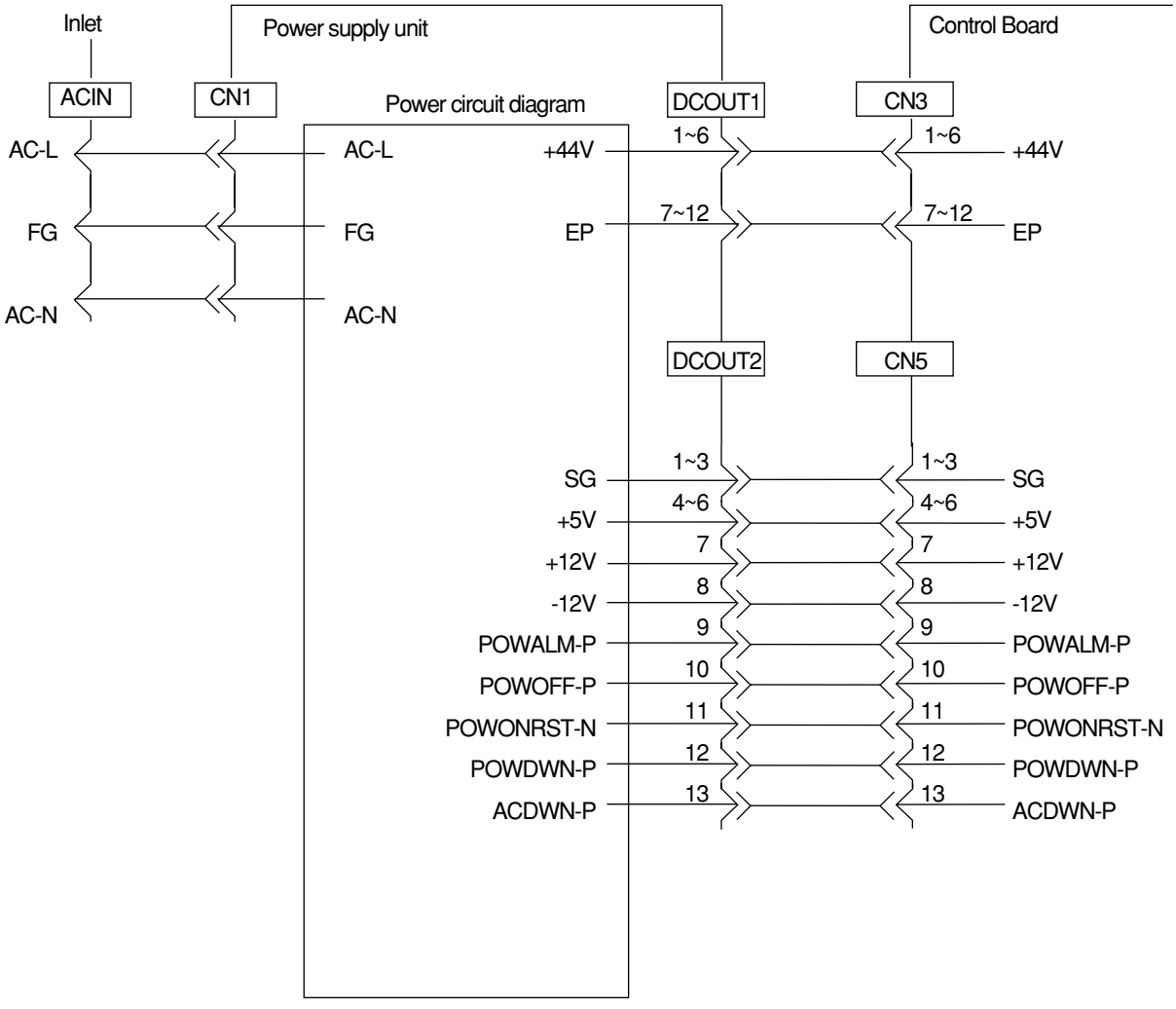
(20) Front Tractor Paper End Switch



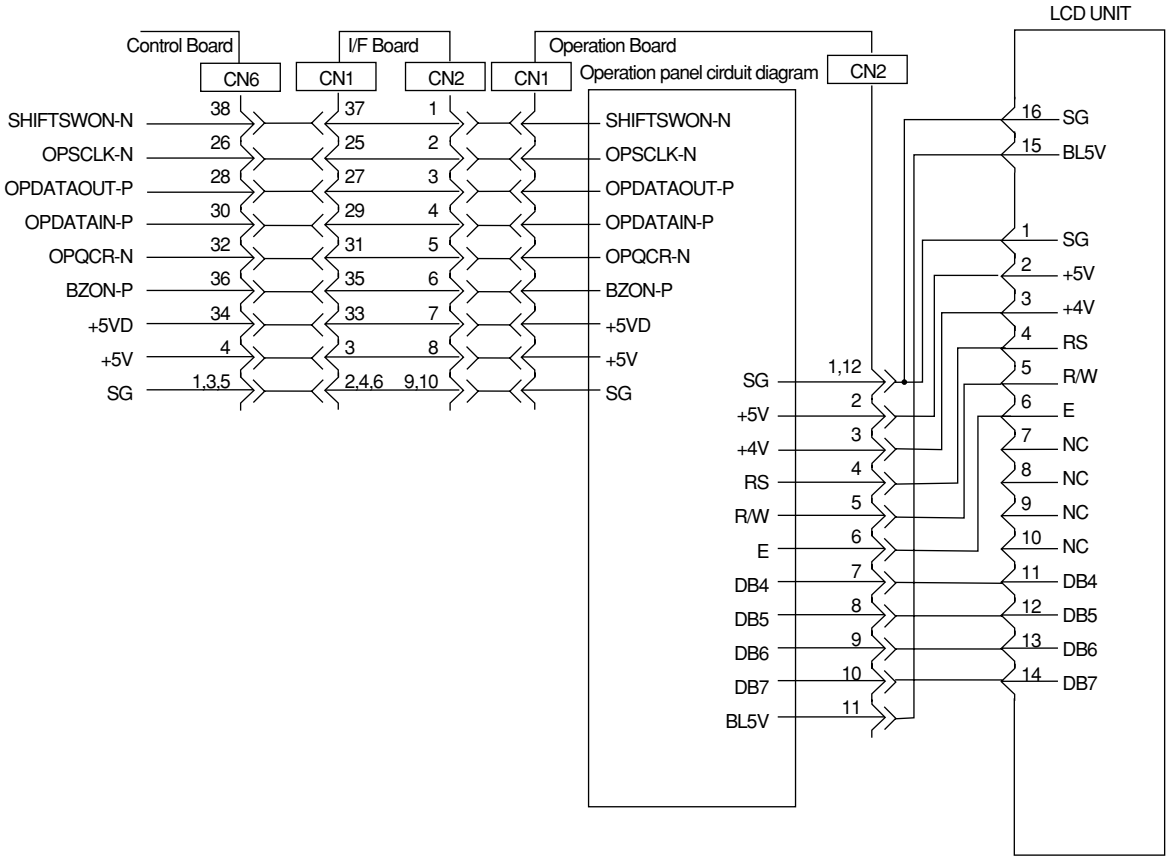
(21) Rear Tractor Paper End Switch



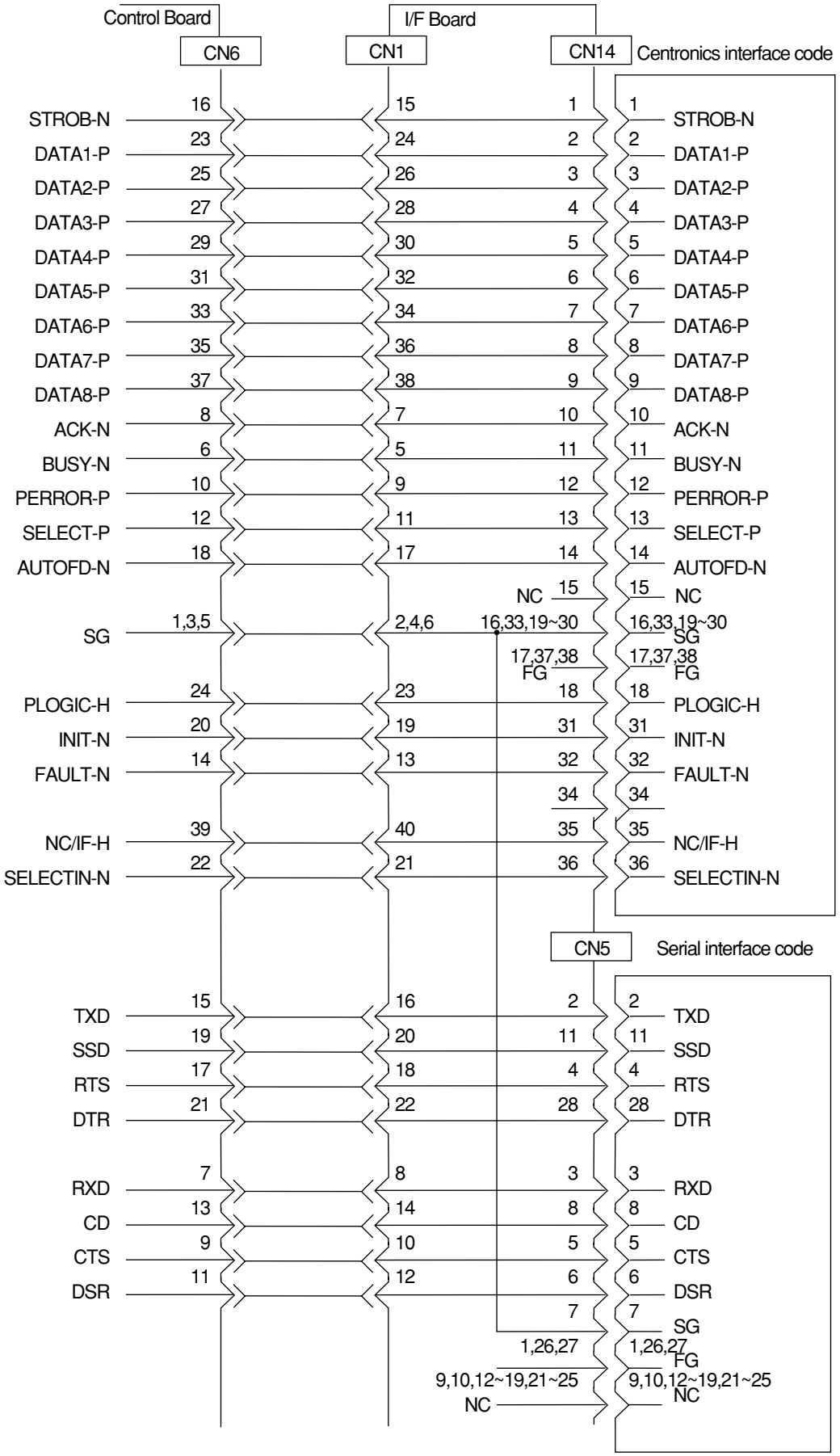
(22) Power Supply Unit



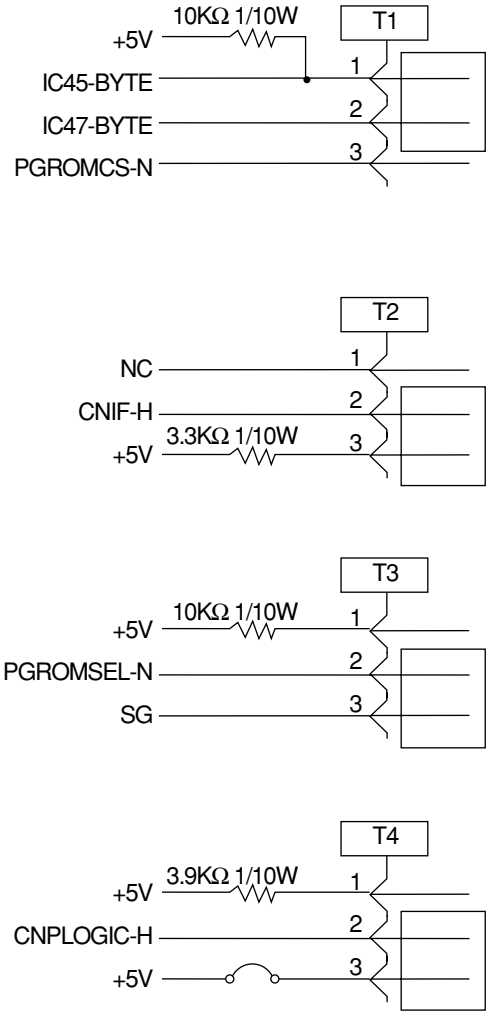
(23) Operation Panel



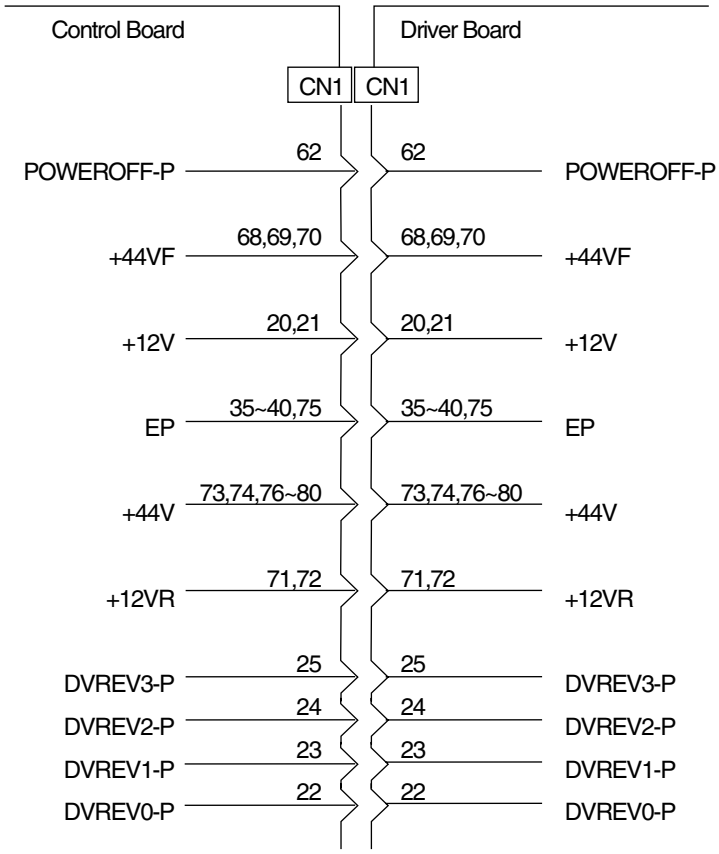
(24) Standard Interface

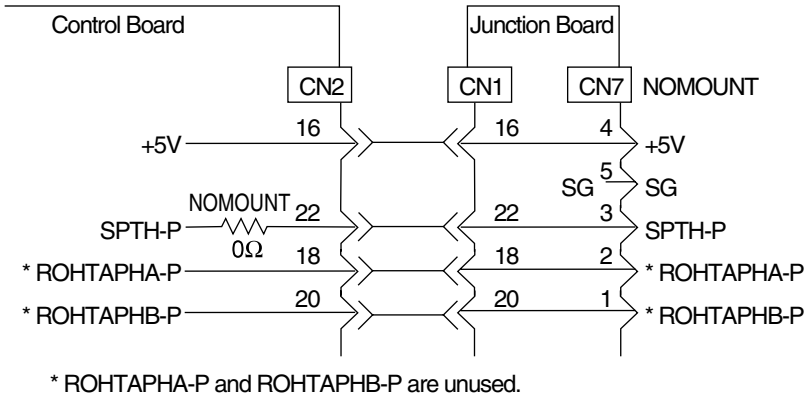

Control Board
I/F Board
CN6
CN1
CN14
Centronics interface code
STROB-N 16 15 1 1 STROB-N
DATA1-P 23 24 2 2 DATA1-P
DATA2-P 25 26 3 3 DATA2-P
DATA3-P 27 28 4 4 DATA3-P
DATA4-P 29 30 5 5 DATA4-P
DATA5-P 31 32 6 6 DATA5-P
DATA6-P 33 34 7 7 DATA6-P
DATA7-P 35 36 8 8 DATA7-P
DATA8-P 37 38 9 9 DATA8-P
ACK-N 8 7 10 10 ACK-N
BUSY-N 6 5 11 11 BUSY-N
PERROR-P 10 9 12 12 PERROR-P
SELECT-P 12 11 13 13 SELECT-P
AUTOFD-N 18 17 14 14 AUTOFD-N
NC 15 15 NC
SG 1,3,5 2,4,6 16,33,19~30 16,33,19~30 SG
17,37,38 17,37,38
FG FG
PLOGIC-H 24 23 18 18 PLOGIC-H
INIT-N 20 19 31 31 INIT-N
FAULT-N 14 13 32 32 FAULT-N
34 34
NC/IF-H 39 40 35 35 NC/IF-H
SELECTIN-N 22 21 36 36 SELECTIN-N
CN5
Serial interface code
TXD 15 16 2 2 TXD
SSD 19 20 11 11 SSD
RTS 17 18 4 4 RTS
DTR 21 22 28 28 DTR
RXD 7 8 3 3 RXD
CD 13 14 8 8 CD
CTS 9 10 5 5 CTS
DSR 11 12 6 6 DSR
7 7 SG
1,26,27 1,26,27
FG
9,10,12~19,21~25 9,10,12~19,21~25
NC NC

(25) Short Plug
* For setting details see the maintenance manual

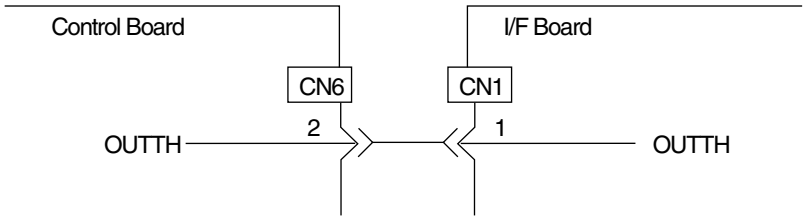


(26) Others

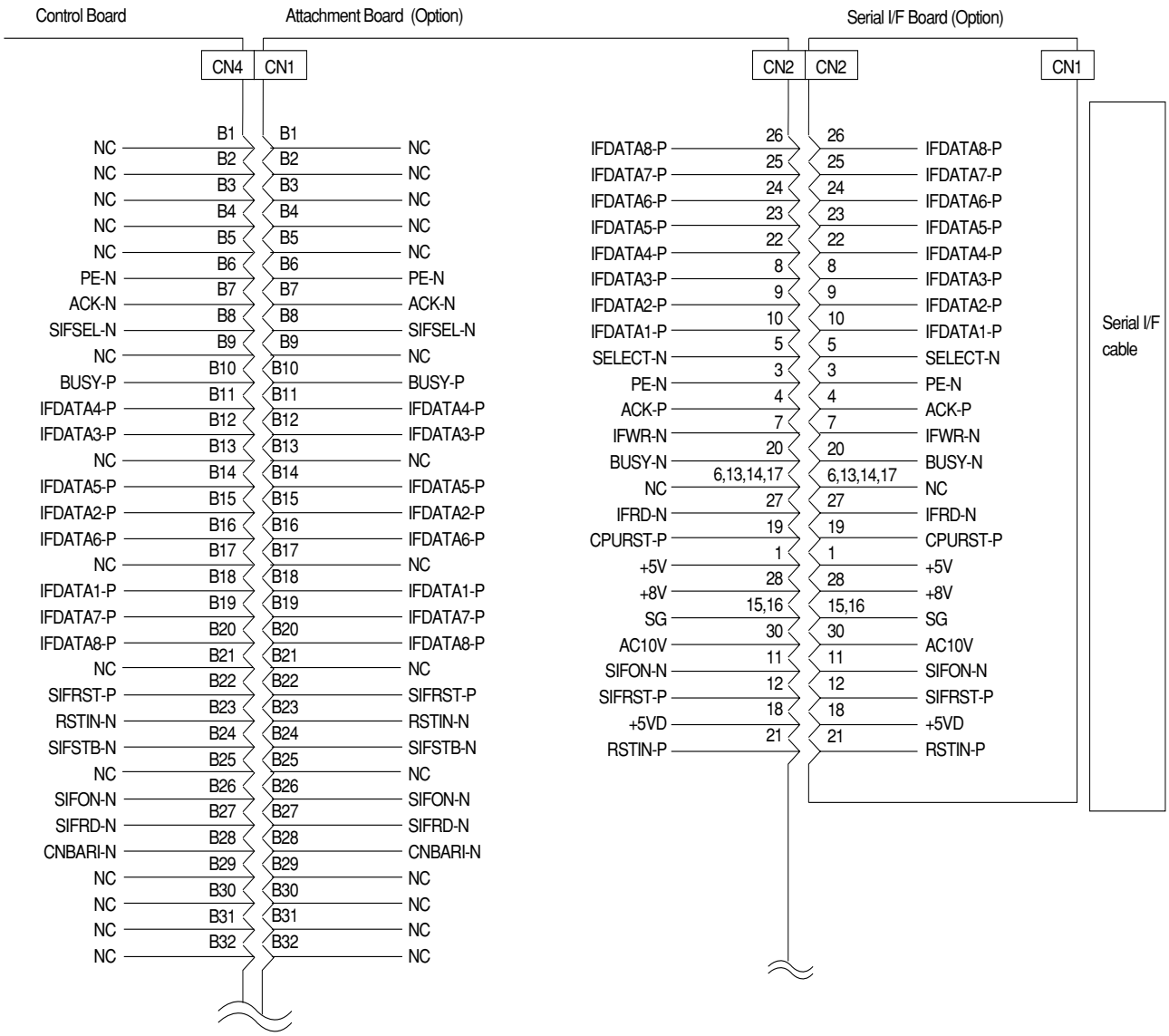


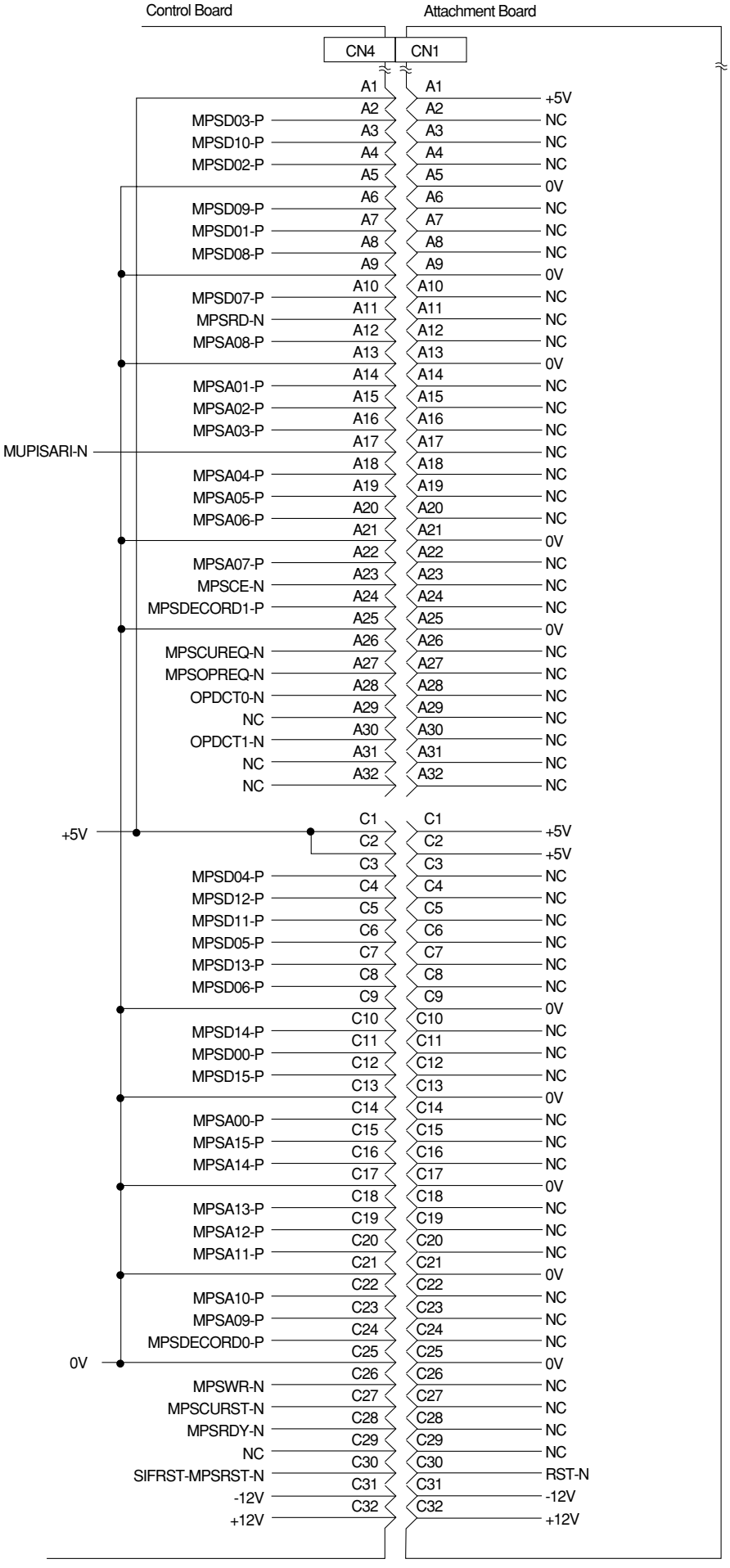


* ROHTAPHA-P and ROHTAPHB-P are unused.

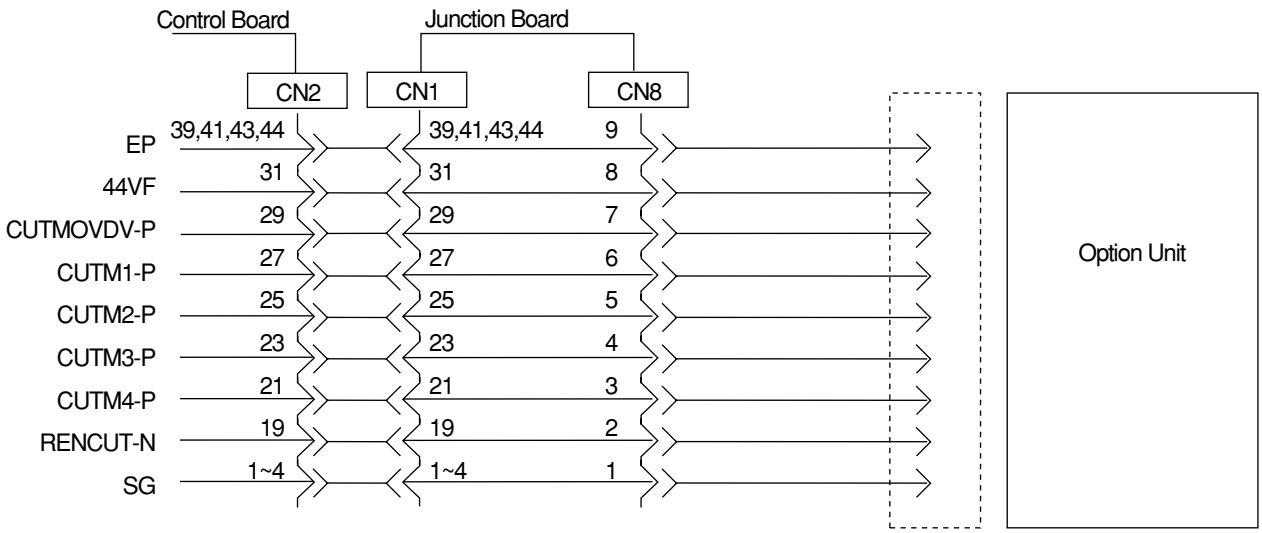


(27) Serial I/F Boaed (Option)




Control Board
Attachment Board
CN4
CN1
A1 A1 +5V
A2 A2 NC
MPSD03-P
A3 A3 NC
MPSD10-P
A4 A4 NC
MPSD02-P
A5 A5 0V
A6 A6 NC
MPSD09-P
A7 A7 NC
MPSD01-P
A8 A8 NC
MPSD08-P
A9 A9 0V
A10 A10 NC
MPSD07-P
A11 A11 NC
MPSRD-N
A12 A12 NC
MPSA08-P
A13 A13 0V
A14 A14 NC
MPSA01-P
A15 A15 NC
MPSA02-P
A16 A16 NC
MPSA03-P
A17 A17 NC
MUPISARI-N
A18 A18 NC
MPSA04-P
A19 A19 NC
MPSA05-P
A20 A20 NC
MPSA06-P
A21 A21 0V
A22 A22 NC
MPSA07-P
A23 A23 NC
MPSCE-N
A24 A24 NC
MPSDECORD1-P
A25 A25 0V
A26 A26 NC
MPSCUREQ-N
A27 A27 NC
MPSOPREQ-N
A28 A28 NC
OPDCT0-N
A29 A29 NC
NC
A30 A30 NC
OPDCT1-N
A31 A31 NC
NC
A32 A32 NC
NC
C1 C1
+5V
C2 C2 +5V
C3 C3
MPSD04-P
C4 C4 NC
MPSD12-P
C5 C5 NC
MPSD11-P
C6 C6 NC
MPSD05-P
C7 C7 NC
MPSD13-P
C8 C8 NC
MPSD06-P
C9 C9 0V
C10 C10 NC
MPSD14-P
C11 C11 NC
MPSD00-P
C12 C12 NC
MPSD15-P
C13 C13 0V
C14 C14 NC
MPSA00-P
C15 C15 NC
MPSA15-P
C16 C16 NC
MPSA14-P
C17 C17 0V
C18 C18 NC
MPSA13-P
C19 C19 NC
MPSA12-P
C20 C20 NC
MPSA11-P
C21 C21 0V
C22 C22 NC
MPSA10-P
C23 C23 NC
MPSA09-P
C24 C24 NC
MPSDECORD0-P
C25 C25 0V
0V
C26 C26 NC
MPSWR-N
C27 C27 NC
MPSCURST-N
C28 C28 NC
MPSRDY-N
C29 C29 NC
NC
C30 C30 RST-N
SIFRST-MPSRST-N
C31 C31 -12V
-12V
C32 C32 +12V
+12V

(28) Option connector



6.6 Troubleshooting Flow Chart

① Power is not supplied.

- The printer cannot be powered at all. : to Ⓐ
  The printer changes off during initialization. : to Ⓑ

Ⓐ Is the connection of AC cable properly made?

Yes / **No**

- Properly reconnect the AC cable.

Is the AC input fuse burnt?

No / Yes

- Replace the AC input fuse with a same type and rated one.
- Remedied?

No / Yes

- End

Replace the power supply unit or connection cable.

Is the connection of cables to the controller the CN5 and power supply unit DCOUT2 properly made?

Yes / **No**

- Properly reconnect the cables.
- Remedied?

No / Yes

- End

Is the connection of cable to the power supply unit the CN1 properly made?

Yes / **No**

- Properly reconnect the cable

Replace Power Supply Unit.

Is the connection of cable to the CN6 on the Control Board properly made?

Yes / **No**

- Reconnect the cable.

Is the connection of cables properly made to the CN1 and the CN2 on the I/F Board?

Yes / **No**

- Properly reconnect the cables

Is the connection of cable to the Operation Board properly made?

Yes / **No**

- Properly reconnect the cable.

Replace the Operation Board or Control Board.

Ⓑ Can the printer be powered on and off when the CN3 cable of the Control Board is disconnected?

No / Yes

- Replace the power supply unit.

Can the printer be powered on and off when the CN2 and the CN6 of the Control Board, and the CN5 of the Driver Board is disconnected?

No / Yes

- Is there any short circuit between 5pin and 4pin, or/and 1pin and 2pin of HTA1 on the Driver Board?

No / Yes

- Replace the Driver Board.

Replace the Control Board.

Can the printer be powered on and off when the CN2 and the CN6 of the Control Board is disconnected?

No / Yes

- Is the printer recovered by replacing the print head?

No / Yes

- End

Change the head cable.

Can the printer be powered on and off when the CN2 of the Control Board and the CN5 of the Driver Board is disconnected?

No / Yes

- Check that the cables for the bail, path change and LF motor, and cables connected to the Control Board and I/F Board are not damaged.

No / Yes

- Replace the damaged cable.

Replace the I/F Board.

Is there any damaged part on the cables for ribbon, space, autogap motor and cables connected to the Control Board?

No / Yes

- Replace the damaged cable.

Replace the Junction Board.

② The printer can be powered on, but stays still without displaying anything on the LCD.

Can the printer recover after the PG ROM is replaced?

No

Yes

- End

Can the printer recover after the Operation Board is replaced?

No

Yes

- End

Replace the Control Board.

③ The printer cannot normally complete the initialization.

Printer status and Message on the LCD:

Although the access cover is close, the printer is in cover open state.		: to Ⓒ
Alarm lamp flashes	Message on the LCD “ERROR, FUSE”	: to Ⓓ
Alarm lamp flashes	Message on the LCD “ERROR, FLASH UNLOAD”	: to Ⓔ
Alarm lamp flashes	Message on the LCD “ERROR, HOMING”	: to Ⓕ
Alarm lamp flashes	Message on the LCD “ERROR, CENTERING”	: to Ⓕ
Alarm lamp flashes	Message on the LCD “ERROR, SPACING”	: to Ⓕ
Alarm lamp flashes	Message on the LCD “ERROR, AUTOGAP”	: to Ⓖ
Alarm lamp flashes	Message on the LCD “ERROR, BEIL”	: to Ⓗ
Alarm lamp flashes	Message on the LCD “ERROR, CHANGE”	: to Ⓘ
Alarm lamp flashes	Message on the LCD “ERROR, OKI HSP CONNECT”	: to Ⓙ
Alarm lamp flashes	Message on the LCD “ERROR, OPT CARD CONNECT”	: to Ⓚ
Alarm lamp flashes	Message on the LCD “ERROR, HEAD THERMISTOR”	: to Ⓛ
Alarm lamp flashes	Message on the LCD “ERROR, HEAD 1 FAN”	: to Ⓜ
Alarm lamp flashes	Message on the LCD “ERROR, HEAD 2 FAN”	: to Ⓝ
Alarm lamp flashes	Message on the LCD “ERROR, POWER FAN”	: to Ⓜ
Alarm lamp flashes	Message on the LCD “ERROR, SPACE FAN”	: to Ⓜ
Alarm lamp flashes	Message on the LCD “ERROR, INVALID IPT”	: to Ⓞ

Ⓒ Although the access cover is close, the printer is in cover open state.

- Check that the cover open switch can normally switch on and off with manufacturing aid function.
- Can it switch on and off normally?

Yes / **No**

- Is the connection of cables to the CN1 and the CN4 on the Junction Board properly made?

Yes / **No**

- Reconnect the cables.

Can the printer recover after the cover open switch/ribbon rotation sensor cable is replaced?

No / Yes

- End

Can the printer recover after the cable between the CN1 on the Junction Board and the CN2 on the Control Board is replaced?

No / Yes

- End

Can the printer recover after the Control Board is repleaced?

No / Yes

- End

Replace the Junction Board.

Is the claw of the access cover broken?

No / Yes

- Replace the access cover.

Has the interlock lever been properly installed?

Yes / **No**

- Reinstall the interlock lever.

Recheck the installation of the cover open switch.

Ⓓ The printer does not operate. The alarm lamp flashes. The LCD reads “ERROR FUSE”.

Is the connection of cable properly made to the CN3 on the Control Board?

Yes / **No**

- Properly reconnect the cable.

Is the connection of cable properly made to the power supply unit connector DCOUT2?

Yes / **No**

- Properly reconnect the cable.

Does the fuse get burnt when powered on with the CN2 and the CN6 of the Control Board disconnected?

No / Yes

- Which of F1 or F2 is the burnt fuse?

F2 / F1

- Replace the Control Board.

Is there any short circuit between 5pin and 4pin, or/and 1pin and 2pin of HTA1 on the Driver Board?

No / Yes

- Replace the Driver Board.

Replace the Control Board.

Does the fuse get burnt when powered on with the CN2 on the Control Board disconnected?

No / Yes

- Is any of the cables for the bail, path change and LF motor, and the connection cable between Control Board and I/F Board damaged?

No / Yes

- Replace the damaged cable.

Replace the I/F Board.

Is any of the cables for the ribbon, space and autogap, and the connection cable between Control Board and Junction Board damaged?

No / Yes

- Replace the damaged cable

Replace the Junction Board.

Ⓔ Alarm lamp flashes. Message on the LCD “ERROR, FLASH UNLOAD”

Is a flash memory used?

Yes / No

- Confirm the settings of the short plug T3 on the Control Board.

  1-2 setting: FLASH ROM selected
  2-3 setting: EP ROM selected

- Has the EPROM been selected?

Yes / No

- Make a proper selection for the short plug.

Replace the Control Board.

Can the printer recover after the program to the FLASH ROM is replaced?

No / Yes

- End

Replace the Control Board.

Ⓕ Spacing error, Alarm lamp flashes. Message on the LCD “ERROR, HOMING”, “ERROR, CENTERING” or “ERROR, SPACING”.

Does the carriage catch a paper?

No / Yes

- Remove the print paper.

Can the carriage run when the printer is powered on?

No / Yes

- to F-1

Is the connection of cable Assy properly made to the DC motor?

Yes / No

- Properly reconnect it.

Is the connection of cable properly made to the CN1 and CN10 on the Junction Board?

Yes / No

- Properly reconnect it.

Is the connection of cable properly made to the CN2 on the Control Board?

Yes / No

- Properly reconnect it.

Check the electrical conductivity of the cable Assy to the DC motor. Is there any problem?

FOW side : Inspect the CN10-2pin and a red terminal of DC motor with the interlock switch turned to on position.
REV side : Inspect the CN10-4pin and a black terminal of DC motor with the interlock switch turned to on position.

No / Yes

- Check the electrical conductivity of only interlock switch. Is there any problem?

No / Yes

- Replace the interlock switch.

Replace the cable Assy.

Can the printer recover after the DC motor is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Replace the connection cable between the CN1 on the Junction Board and the CN2 on the Control Board.

F-1

Is the carriage belt loose?

No | Yes

- Properly adjust the tension of the belt.

Is the connection of cable properly made to the CN8 on the Control Board?

Yes | No

- Properly reconnect it.

Is the slit sensor cable at the lower part of space motor properly connected to the cable from the unit?

Yes | No

- Properly reconnect them

Is there any incorrect point in the connection to terminals of space motor?

Black cable : to the unmarked terminal
Red cable : to the terminal marked in red.

Yes | No

- Make a proper connection.

Check the electrical conductivity of ϕA (1pin) and ϕB (2pin) at the both ends of relay sensor cable (black shielded cable).

- Is there the passage of current?

Yes | No

- Replace the relay sensor cable.

Can the printer recover after the space motor is replaced?

No | Yes

- End

Replace the Control Board.

Ⓖ Alarm lamp flashes. Message on the LCD “ERROR AUTOGAP”

Does the carriage run during initialization?

No / Yes

- to G-1

Does the platen normally move during initialization?

Yes / No

- G-4 Is the connection properly made to the CN1 and the CN2 on the Junction Board?

Yes / No

- Make a proper connection.

Is the connection of cable properly made to the CN2 on the Control Board?

Yes / No

- Properly reconnect the cable.

Is the gear between the autogap motor and platen in normal state? Does it disengage?

Yes / No

- Reinstall the gear in place. If it is damaged, replace it.
- If the gear of the autogap motor is damaged, replace the whole autogap motor.

Can the printer recover after the autogap motor is replaced?

No / Yes

- End

Can the printer recover after the Driver Board is replaced?

No / Yes

- End

G-3 Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the Control Board the CN2 and Junction Board the CN1 is replaced?

No / Yes

- End

Replace the Junction Board.

Is the connection of cables properly made to the CN1 and the CN3 on the Junction Board, and the CN1 on the AG Board?

Yes / No

- Properly reconnect the cables.

Is the connection of cables properly made to the CN2 and the CN8 on the Control Board?

Yes / No

- Properly reconnect the cables.

G-2

G-1

Does the platen normally operate during initialization?

Yes / **No**

- to G-4

Can the printer recover after the head gap is readjusted?

No / Yes

- End

Can the printer recover after the core gap is readjusted?

No / Yes

- End

Is the connection of cables properly made to the CN1 and the CN3 on the Junction Board, and the CN1 on the AG Board?

Yes / **No**

- Properly reconnect them.

Is the connection of cables properly made to the CN2, CN6 and the CN8 on the Control Board?

Yes / **No**

- Properly reconnect them.

Is the connection of cables properly made to the CN1 and the CN9 on the I/F Board?

Yes / **No**

- Properly reconnect them.

Has the autogap slit sensor and autogap slit disk been installed in a proper position.

Yes / **No**

- Reinstall them in place.

Is the gear between the autogap motor and platen in a normal state? Does it lose a tooth (teeth)? Is the load too heavy?

Yes / **No**

- Reinstall the gear in place. If it is damaged, replace it.
- If the gear of the autogap motor is damaged, replace the whole motor.

Can the printer recover after the AG Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN3 on the Junction Board and the CN1 on the AG Board is replaced?

No / Yes

- End

G-5

G-2

Has the autogap slit sensor and autogap slit disk been installed in a proper position?

Yes | **No**

- Reinstall them.

Is the gear between the autogap motor and platen in a normal state? Does it lose a tooth (teeth)? Is the load too heavy?

Yes | **No**

- Reinstall the gear in place. If it is damaged, replace it.
- If the gear of autogap motor is damaged, replace the whole autogap motor.

Can the printer recover when the AG Board is replaced?

No | Yes

- End

Can the printer recover after the connection cable between the CN3 of Junction Board and the CN1 of AG Board is replaced?

No | Yes

- End

G-3

G-5

Can the printer recover after the print start sensor and/or coregap cable is replaced?

No

Yes

- End

Can the printer recover after the Control Board is replaced?

No

Yes

- End

Can the printer recover after the connection cable between the CN2 on the Control Board and the CN1 on the Junction Board is replaced?

No

Yes

- End

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN1 on the I/F Board is replaced?

No

Yes

- End

Can the printer recover after the Junction Board is replaced?

No

Yes

- End

Replace the I/F Board.

Ⓗ The alarm lamp flashes after the motion of carriage. LCD reads “ERROR, BAIL”.

Does the bail operate during initialization?

Yes / **No**

- Is the connection of cables properly made to the CN2 and the CN1 on the I/F Board?

Yes / **No**

- Reconnect them properly.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes / **No**

- Properly reconnect it.

Is the gear between the bail motor and bail damaged?

No / Yes

- Replace the damaged gear. If the gear of the bail motor is damaged, replace the bail motor.

Can the printer recover after the bail motor is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the relay cable is replaced?

No / Yes

- End

Replace the I/F Board.

Is the connection of cables properly made to the CN1 and the CN3 on the I/F Board?

Yes / **No**

- Properly reconnect them.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes / **No**

- Properly reconnect it.

Can the printer recover after the bail open switch and/or front tractor on-switch cable is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN1 on the I/F Board is replaced?

No / Yes

- End

Replace the I/F Board.

ⓘ The alarm lamp flashes after the motion of carriage. LCD reads “ERROR, PATH CHANGE”

Does the tractor change lever operate during initialization?

Yes / No

- Is the connection of cables properly made to the CN1 and the CN7 on the I/F Board?

Yes / No

- Properly reconnect them.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes / No

- Properly reconnect it.

Is there any damage on the gear between the path change motor and tractor change lever?

No / Yes

- Replace the damaged gear. If the gear of the path change motor is damaged, replace the path change motor.

Can the printer recover after the path change motor is replaced?

No / Yes

- End

Can the printer recover after the Driver Board is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN1 on the I/F Board is replaced?

No / Yes

- End

Replace the I/F Board.

Is the connection of cables properly made to the CN1 and the CN11 on the I/F Board?

Yes / No

- Properly reconnect it.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes / No

- Properly reconnect it.

Can the printer recover after the bail open switch and/or front tractor switch cable is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN1 on the I/F Board is replaced?

No / Yes

- End

Replace the I/F Board.

Ⓙ Alarm lamp flashes. LCD reads “ERROR, OPT CARD CONNECT”

Has the optional I/F Board properly mounted to the Attachment Board?

Yes / **No**

- Properly remount the Serial I/F Board (option).

Can the printer recover after the Serial I/F Board is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Replace the Attachment Board.

Ⓚ Missing number

Ⓛ Alarm lamp flashes, Message on the LCD “ERROR, HEAD THERMISTOR”

Can the printer recover after the head cable is replaced?

No / Yes

- End

Can the printer recover after the Driver Board is replaced?

No / Yes

- End

Replace the Control Board.

Ⓜ Alarm lamp flashes, Message on the LCD “ERROR, HEAD 1 FAN”, “ERROR, HEAD 2 FAN” and “ERROR, SPACE FAN”

Can the printer recover after the FAN shown in the error message is replaced?

No

Yes

- End

Can the printer recover after the Control Board is replaced?

No

Yes

- End

Can the printer recover after the connection cable between the CN1 on the Junction Board and the CN2 on the Control Board?

No

Yes

- End

Replace the Junction Board.

Ⓝ Alarm lamp flashes, Message on the LCD “ERROR, HEAD 2 FAN”

Can the printer recover after the head cooling FAN 2 is replaced?

No

Yes

- End

Can the printer recover after the Control Board is replaced?

No

Yes

- End

Can the printer recover after the connection cable between the CN1 on the I/F Board and the CN6 on the Control Board?

No

Yes

- End

Replace the I/F Board.

Ⓞ Alarm lamp flashes, Message on the LCD “ERROR, INVALID IPT”

Replace the Control Board.

④ function is not started when the switch is pressed on the operator panel.

Is the connection of cable between the CN1 on the Operation Board and the CN12 on the I/F Board normal?

Yes | **No**

- Properly reconnect the cable.

Check the electrical conductivity between the CN1 on the Operation Board and the CN12 on the I/F Board.

- Is there the passage of current?

Yes | **No**

- Replace the connection cable.

Can the printer recover after the Operation Board is replaced?

No | Yes

- End

Replace the CN6 on the Control Board and the CN1 on the I/F Board. Can the problem be resolved?

No | Yes

- End

Can the printer recover after the I/F Board is replaced?

No | Yes

- End

Replace the Control Board.

⑤ Alarm lamp flashes, LCD reads “ERROR, RIBON JAM”

Is the ribbon feed during initialization?

Yes / **No**

- Is the connection of cable properly made to the CN1 and the CN9 on the Junction Board?

Yes / **No**

- Properly reconnect it.

Is the connection of cable properly made to the CN2 on the Control Board?

Yes / **No**

- Properly reconnect it.

Can the printer recover after the ribbon motor is replaced?

No / Yes

- End

Can the printer recover after the ribbon gear Assy is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN1 on the Junction Board and the CN2 on the Control Board is replaced?

No / Yes

- End

Replace the Junction Board.

Has the ink ribbon rotation sensor been properly installed?

Yes / **No**

- Properly reinstall it.

Is the connection of cable properly made to the CN4 and the CN1 on the Junction Board?

Yes / **No**

- Properly reconnect it.

Is the connection of cable properly made to the CN2 on the Control Board?

Yes / **No**

- Properly reconnect it.

Can the printer recover after the cover open switch and/or ribbon rotation sensor cable is replaced?

Yes / **No**

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

5-1

5-1

- Can the printer recover after the Junction Board is replaced?

No

Yes

- End

Replace the connection cable between the CN2 on the Control Board and the CN1 on the Junction Board.

⑥ Line feed trouble

Printer status and Message on the LCD

Alarm lamp flashes, Message on the LCD “ERROR, FEED JAM” : to Ⓟ
Paper has set on the tractor, but is not feed in. The LCD reads “OFF-LINE, PAPER END” : to Ⓠ
Alarm lamp flashes, Message on the LCD “ERROR, PAPER JAM” : to Ⓡ

Ⓟ Alarm lamp flashes. LCD reads “ERROR, FEED JAM”

Is any paper jammed in the paper feeding route?

No | Yes

- Remove the print paper.

Is the LF motor (tractor unit) running?

No | Yes

- to P-1

Is the connection of cables properly made to the CN1 and the CN13 on the I/F Board?

Yes | No

- Properly reconnect them.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes | No

- Properly reconnect it.

Is the gear between the LF motor and tractor unit damaged?

No | Yes

- Replace the damaged gear. When the gear of the LF motor is damaged, replace the LF motor.

Can the printer recover after the Control Board is replaced?

No | Yes

- End

Can the printer recover after the LF motor is replaced?

No | Yes

- End

Can the printer recover after the connection cable between the CN1 on the I/F Board and the CN6 on the Control Board is replaced?

No | Yes

- End

Replace the I/F Board.

P-1

- Is the connection of cables properly made to the CN1 and the CN3 on the I/F Board?

Yes / **No**

- Properly reconnect it.

Is the connection of cable properly made to the CN6 connector on the Control Board?

Yes / **No**

- Properly reconnect it.

Is there any problem on the installation of Feed Jam sensor?

No / Yes

- Properly reinstall it.

Can the printer recover after the FEED JAM and/or bail paper end sensor cable is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN1 on the I/F Board and the CN6 on the Control Board?

No / Yes

- End

Replace the I/F Board.

Ⓠ Paper has been set on the tractor, but is not feed in. Message on the LCD “OFF-LINE, PAPER END”

- Confirm that the tractor being used (Front or Rear) is normally switched on/off according to the Maintenance manual.
- Is the tractor normally switched on/off?

Yes / **No**

- Is the connection of cable properly made to the CN5 (front tractor) and the CN4 (rear tractor)?

Yes / **No**

- Properly reconnect it.

Replace the front tractor paper end switch cable and rear tractor paper end switch cable (the cable with a problem should be selected). Can the problem be resolved?

No / Yes

- End

Can the printer recover after the connection cable between the CN1 on the I/F Board and the CN6 on the Control Board is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Replace the I/F Board.

Recheck the installation of tractor paper end switch.

Ⓡ Alarm lamp flashes, Message on the LCD “ERROR, PAPER JAM”

Is the paper on the feeding route torn?

No Yes

- Remove any torn paper and load a new paper.

Is the connection of cables properly made to the CN1 and the CN9 on the I/F Board?

Yes No

- Properly reconnect them.

Is the connection of cable properly made to the CN6 on the Control Board?

Yes No

- Properly reconnect it.

Can the printer recover after the print start sensor and/or coregap cable is replaced?

No Yes

- End

Can the printer recover after the connection cable between the CN1 on the Control Board and the CN6 on the Control Board is replaced?

No Yes

- End

Replace the I/F Board.

⑦ Character and dot lack

Is the trouble identified as character lack?

Yes / **No**

- In the event of dot lack, go to Ⓢ.

Can the self-test printing be normally performed?

Yes / **No**

- Replace the Control Board.

Is the interface cable and/or network cable properly connected?

Yes / **No**

- Properly reconnect them.

Is the connection of cable properly made to the CN6 on the Control Board and the CN1 on the I/F Board?

Yes / **No**

- Properly reconnect them.

Can the printer recover after the interface cable is replaced?

No / Yes

- End

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN6 on the I/F Board is replaced?

No / Yes

- End

Replace the I/F Board.

Ⓢ Has the headgap been accurately adjusted?

Yes / **No**

- Readjust the headgap as stated in the Maintenance Manual.

Perform the head pin test as stated in the Maintenance Manual.
- Is a particular pin lacked?

Yes / **No**

- Go to ⑭.

Can the printer recover after the print head is replaced?

No / Yes

- End

Can the printer recover after the Driver Board is replaced?

No / Yes

- End

Can the printer recover after the Control Board is replaced?

No / Yes

- End

Replace the head cable.

⑧ Thin printing

Has the ink ribbon reached its life end?

No Yes

- Replace the ink ribbon.

Has the headgap been accurately adjusted?

Yes **No**

- Accurately readjust it.

Can the printer recover after the print head is replaced?

No Yes

- End

Replace the Driver Board.

⑨ The printer can normally operate, but not start printing.

- In the event of the use of Serial I/F Board, go to 9-1.
- Can the printer perform the self-test.

Yes / **No**

- Replace the Control Board.

Is the I/F cable properly connected?

Yes / **No**

- Properly reconnect it.

Can the printer recover after the I/F cable is replaced?

No / Yes

- End

Which of parallel or serial is used for the I/F?

Parallel / Serial

- Is the settings of serial I/F correct?

Yes / **No**

- Accurately reset it.

Is the connection of cable properly made to the CN6 on the Control Board and the CN1 on the I/F Board?

Yes / **No**

- Properly reconnect it.

Can the printer recover after the connection cable between the CN6 on the Control Board and the CN1 on the I/F Board is replaced?

No / Yes

- End

Can the printer recover after the I/F Board is replaced?

No / Yes

- End

Replace the Control Board.

9-1

Can the printer perform the self-test?

Yes / No

- Replace the Control Board.

Is the I/F cable properly connected?

Yes / No

- Properly reconnect it.

Do the settings of serial I/F meet the system?

Yes / No

- Accurately redo the settings.

Can the printer recover after the I/F cable is replaced?

No / Yes

- End

Confirm if the printer recognizes the Attachment Board, an attachment to the Serial I/F Board, using the menu. If “Opt. Card” appears when “Set-up” is selected for Group and “Host Interface” for Item in menu setting, the printer is considered to recognize this Attachment Board.

- Can the printer recognize the Attachment Board?

Yes / No

- Is the Attachment Board and Control Board properly connected?

Yes / No

- Properly reconnect them.

Replace the Attachment Board.

Confirm if the printer recognizes the Serial I/F Board using the menu. If “Serial I/F (OP)” appears in Group of menu setting, the printer can be considered to recognize this Serial I/F Board.

- Can the printer recognize the Serial I/F Board?

Yes / No

- Is the Serial I/F Board properly connected to the Attachment Board?

Yes / No

- Properly reconnect it.

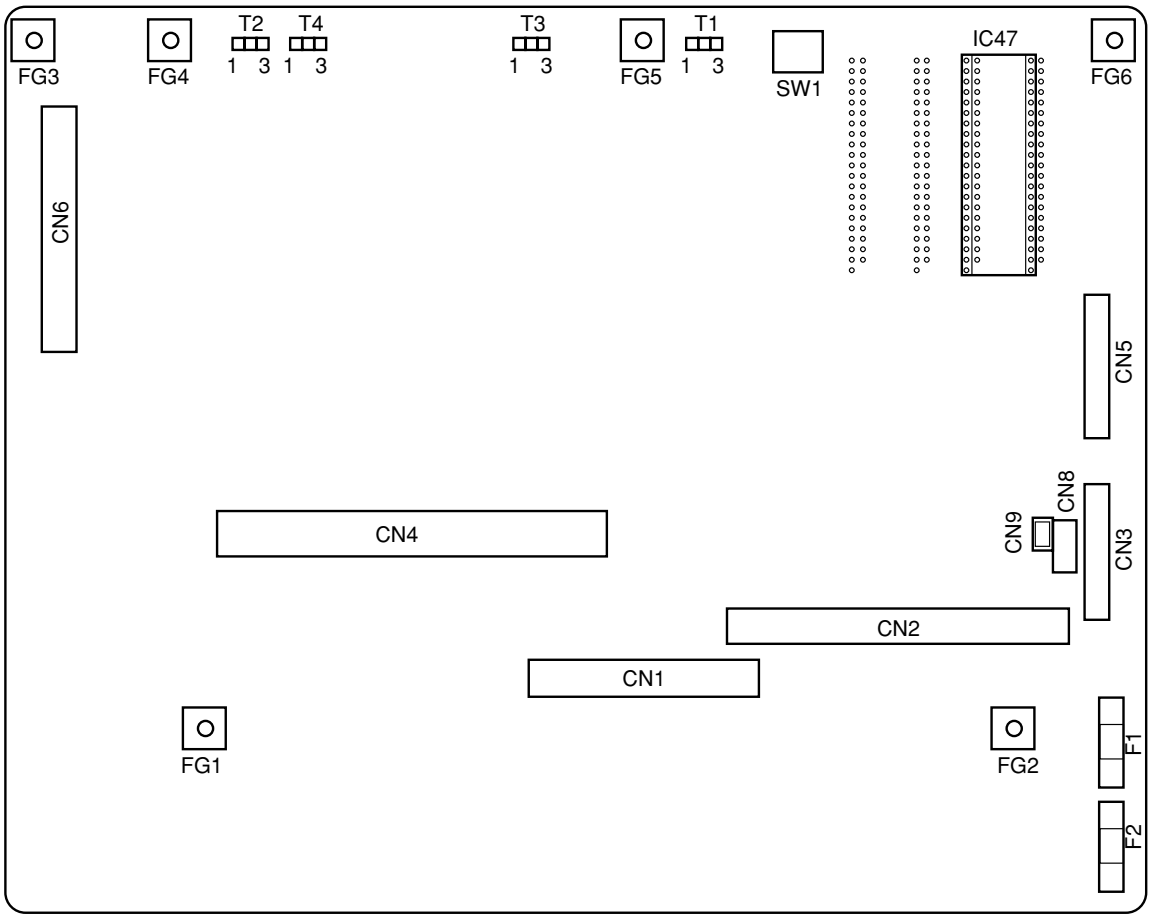
Replace the Serial I/F Board.

Replace the Control Board.

Appendix A PCB LAYOUT

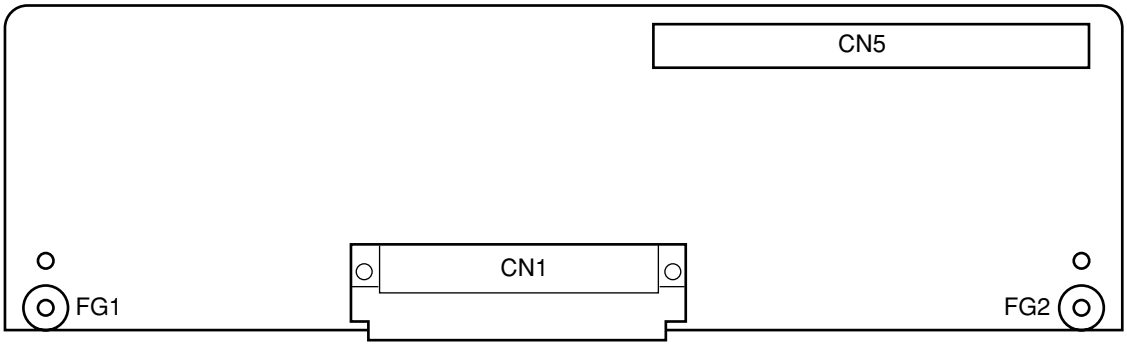
(1) Control Board
(2) Driver Board
(3) Operation Board
(4) I/F Board
(5) Junction Board
(6) AG Board

(1) Control Board

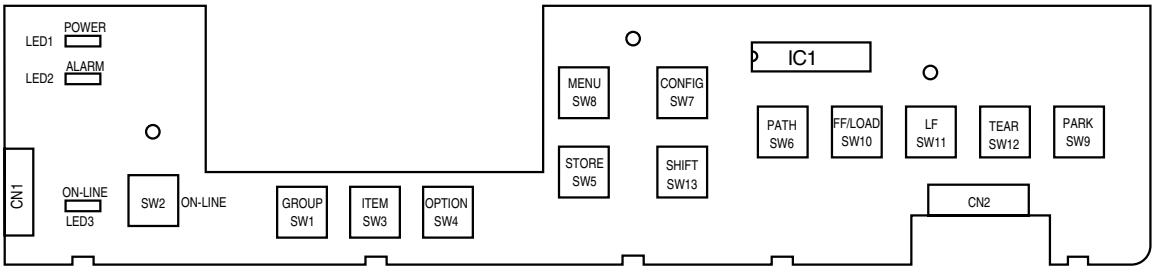


Short plug		Setting	Default
T1 (1 3)	1-2	When either PGROM or CGROM is 8 or 16Mbit mask ROM.	1-2
	2-3	When either PGROM or CGROM is 32Mbit mask ROM.	
T2 (1 3)	Centronics I/F (Pin No.35)		2-3
	1-2	In IEEE1284 mode.	
	2-3	Compatible with PM3410.	
T3 (1 3)	1-2	When the PGROM is EPROM (IC46).	1-2
	2-3	When the PGROM is mask ROM (IC45).	
T4 (1 3)	Centronics I/F (Pin No.18)		2-3
	1-2	In IEEE1284 mode.	
	2-3	Compatible with PM3410.	

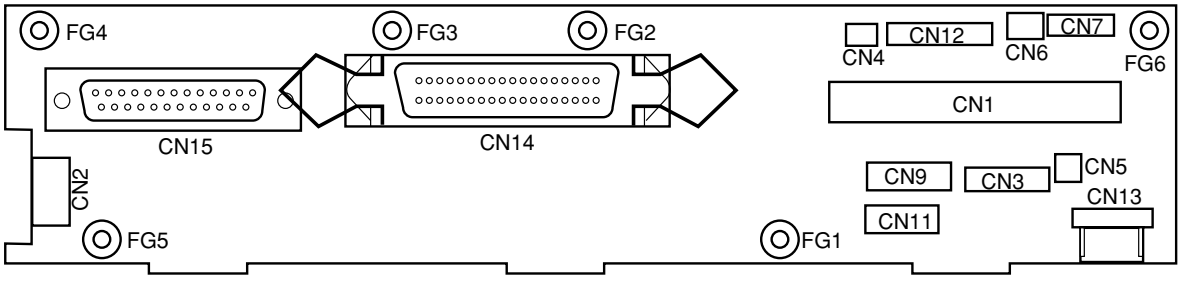
(2) Driver Board



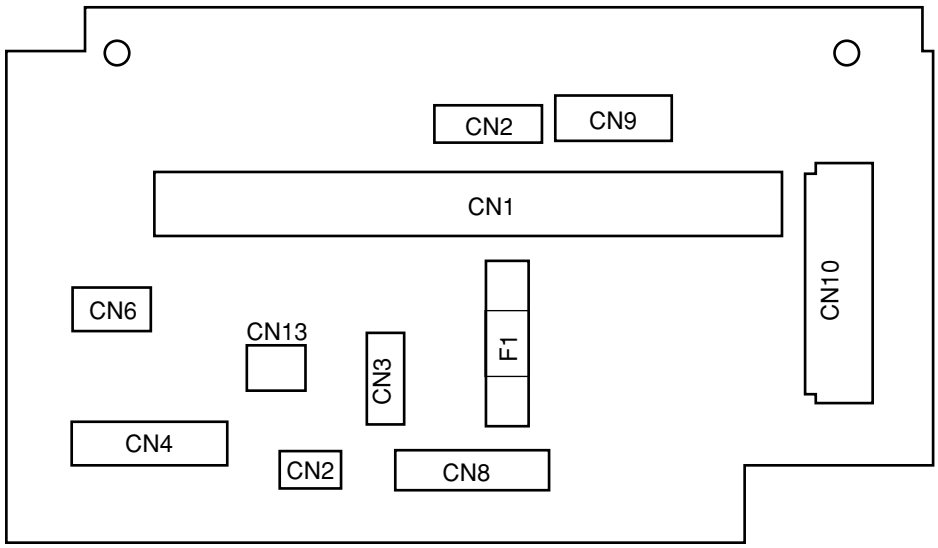
(3) Operation Board



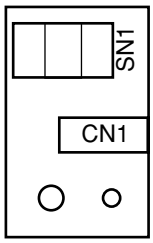
(4) I/F Board



(5) Junction Board



(6) AG Board



APPENDIX B RS-232C SERIAL I/F BOARD (Option)

1. GENERAL

This section describes the operation of the RS-232C Serial I/F card installed in the Printer as an option using a start-stop synchronization and serial communications circuit. This serial I/F Board is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: printer Ready/Busy and X-ON/X-OFF modes.

For this serial I/F Board to be installed in a Pacemark 4410 or Microline 4410, you need to have an Attachment Board .

2. OPERATION DESCRIPTION

2.1 Element Description

(1) 80C51 with MASK ROM
An eight-bit microprocessor controller that controls the following:

(a.) Serial interface protocol and data transfer through a serial port.
(b.) Message buffer.
(c.) Transmission of parallel data to the printer.

(2) SN75189
An RS-232C standard line receiver

(3) SN75188
An RS-232C standard line driver.

(4) 2764
An 8 kbyte ROM that contains the serial interface control program.

(5) HM6264
An 8192-byte static RAM used as a message buffer.

2.2 Circuit Description

A block diagram is shown in Figure B-2-1.

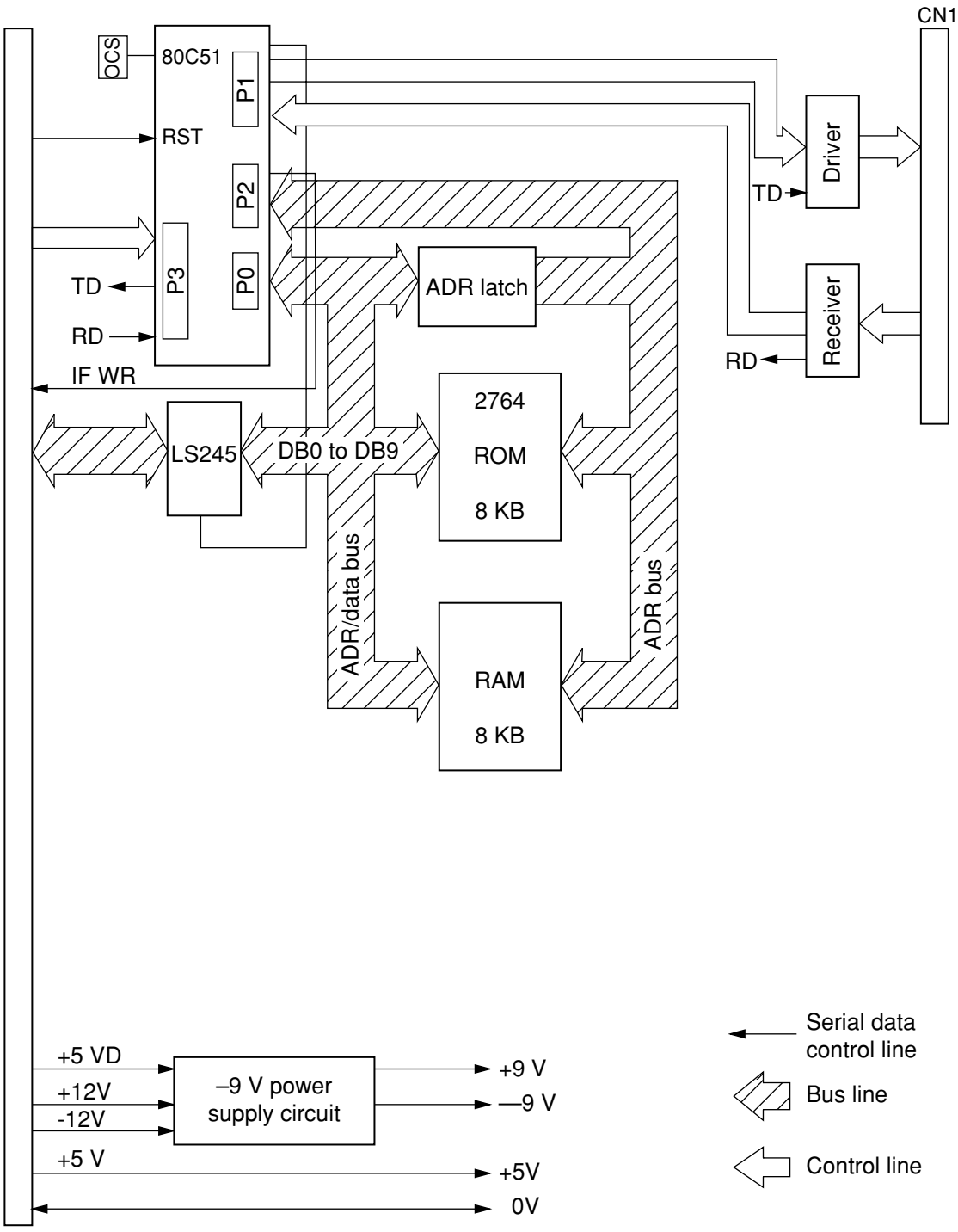


Figure B-2-1 Block Diagram

2.2.1 Operation at power on

After power is turned on, an RST OUT signal is sent from the printer control board to reset the printer. When the reset is canceled, the 80C51 CPU performs initialization. Initialization consists of setting the 80C51 timer, and setting the serial mode.

2.2.2. RS232C Serial I/F

The DTR, SSD, TD and RTS signals output by the 80C51 are converted to RS232C Serial I/F signals by line driver SN75188 (Q1) and sent to the I/F.

In addition, signals DSR, CTS, CD, and RD on the RS232C Serial I/F are converted to TTL level by line receiver SN75189 (Q2) and input to the 80C51.

2.3 Local Test

2.3.1 Circuit test mode

2.3.1.1 Setting

(1) Diagnostic test (set by menu)

(2) Test connector

Connect the test connector shown in Figure B-3-6 to the I/F connector

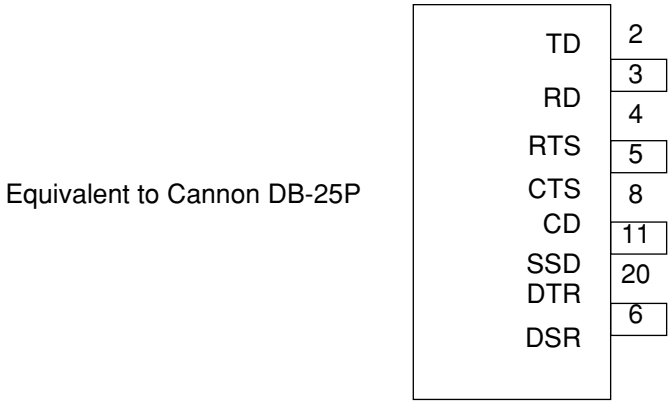


Figure B-3-6 Test Connector Connection Diagram

2.3.1.2 Function

After the settings outlined in Section 3.3.1.1 are completed and power is turned on, the serial I/F checks the message buffer memory and I/F driver/receiver circuit. It then prints characters.
To start and stop this test, push the SEL switch on the front of the printer.
Details of this test are explained on the next page.

(1) The program revision using two numerical characters is printed.

(2) “LOOP TEST” is printed.

(3) Memory is checked for the message buffer.

(4) Prints “OK” is printed if the memory check is OK and “BAD” is printed if the memory check fails.

(5) Output level to DTR, RTS, and SSD signals is dropped low. If DSR, CTS, or CD signals is High, “IF BAD” is printed. If DSR, CTS, and CD signals are all Low, “IF OK” is printed.

(6) Output level to DTR, RTS, and SSD signals is raised high. If DSR, CTS, or CD signals is Low, “IF BAD” is printed. If DSR, CTS, and CD signals are all High, “IF OK” is printed.

(7) Transmits characters codes from 20H to 7FH is transmitted by SD signal. At the same time, characters are received by the RD signal and stored in the message buffer.

(8) The characters that were stored in the message buffer as indicated in (7) are printed.

(9) Steps (1) through (8) are repeated until test is interrrupted.

Appendix C Maintenance-Support Function

1. Normal mode

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, —: ignored)				Function
4	3	2	1	
—	—	—	—	Normal mode

(2) Power ON Switch Function

Switch								Function
SEL/ RESET	MENU	CON-FIG	PATH/ TOF	FF/ LOAD	LF	TEAR	PARK	
	○							Starts menu mode
	○	○						Starts menu maintenance mode
					○			Starts demo-pattern self test
			○					Starts rolling ASCII self test
				○		○		Starts head pin test
				○				Starts HEX DUMP mode

Switch					Function
GROUP	ITEM	Option	STORE	MENU	
○	○				Sets MENU setting CFG 1 to factory default. Note (1)
	○	○			Sets MENU setting CFG 2 to factory default. Note (1)
○		○			Sets paper input location to factory default.
		○	○		Sets MENU setting (CFG 1 and 2)/paper input location to factory default. Note (1)
			○	○	Sets header/MENU settings (CFG 1 and 2) to ROM fixed values. Sets paper input location to factory default.

Note (1) Registration/flash ROM USED setting holds the values of current setting.

2. Maintenance mode 1

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, —: ignored)				Function
4	3	2	1	
—	—	—	○	Maintence function enabled mode

(2) Power ON Switch Function

Switch								Function (Valid when DIP switch-1 is ON)
ON-LINE	SHIFT	CON-FIG	PATH/ TOF	FF/ LOAD	LF	TEAR	PARK	
			○		○			Starts learning function for slice level of paper width sensor.
					○		○	Starts auto-gap test.
				○	○			Gap open/close test.
		○		○				Starts gap close.
			○			○		Starts ON/OFF test for all sensors.
				○			○	Starts the alignment of print start position sensor.
	○	○						Resets the counter of print character number
						○	○	Starts AG correction mode.
					○	○		Starts AG adjustment aid mode.
			○				○	Flash Loading Mode (Never use the item.)
○		○						Starts aging mode (10 min.)
○	○							Starts aging mode (5 min.)

The above switches are also valid during Limited Operation.
The empty boxes indicate not-pressed switches.
○: indicates that the switch is pressed.

3. Maintenance mode 2

(1) DIP Switch Settings

DIP Switch (O: ON, X: OFF, —: ignored)				Function
4	3	2	1	
—	—	○	—	Maintence information indication enabled mode

(2) Operator panel switch Function

Switch								Function (Valid when DIP switch-2 is ON)
STORE	SHIFT	CON-FIG	PATH/ TOF	FF/ LOAD	LF	TEAR	PARK	
○	○							The LCD displays the maintenance information (total page number, number of print characters) for 2 seconds.

(3) Maintenance Information Display Condition

Condition / LCD		Maintenance Information Display	
		Function	Display Data
Top line	1~8	Displays the value of line feed counter.	Current counter value
	9~16	Displays the value of print counter.	Current counter value
Bottom Line	1~8	Displays a correction value for AG centering.	Current counter value
	9~16	Reserved	

(4) Stored historical page number data

This function counts a page each 11inch and stores it to EEPROM.
The storage capacity for the counter is 3byte, which equals to pages for 70 years at 20000 pages/ month.
As the printer has no function which is capable of resetting this counter, line feed frequency can be known since the printer's shipment.

(5)

a)Stored histrical printed character number data

This function counts the number of actually printed characters and stores it to EEPROM.
It reads and analyses the characters from receiving buffer and identifies the characters which has been actually printed and counts them.
The count of image data for any DPI should be increases by one character each 12 columns,
The storage capacity for the counter is 3byte, which equals to 430 million characters with 256 characters counted as 1 count.
As the printer has the function which is capable of resetting this counter to zero, The usage frequency of print head ribbon can be known as an index by resetting this counter when replacing a print head and ribbon set.

b)Printed character number counter resetting function

Activating	Power on, holding SHIFT + CONFIG switches.
Releasing	
Condition	When DIP switch 1 has been turned on.
Subject	Printed character number counter (EEPROM data)

This function resets the counter for the number of printed characters to zero, which is stored in the EEPROM.
This function is advanced in the following steps.

1) This function starts, showing the following indications on the LCD.
   Top line : INITIALIZING
   Bottom Line : COUNTER RESET
2) It resets the printed character number counter to "0" and rewrite the EEPROM.
3) The printer returns to the normal Power On condition.